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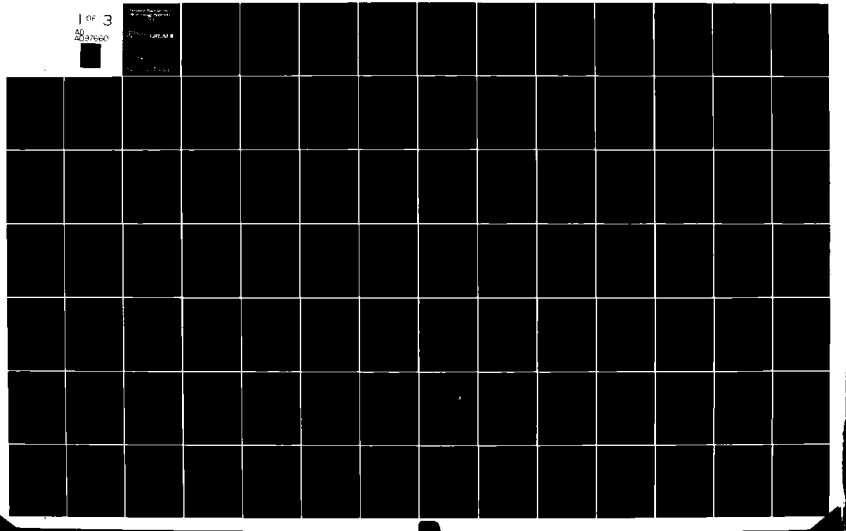

Dredged Material Uses Work Group Appendix

LEVEL II

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FINAL
DECEMBER
1980

GREAT II

Upper Mississippi River
(Guttenberg, Iowa to Saverton, Missouri)

Great River Environmental Action Team

DREDGED MATERIAL USES APPENDIX

to

Final Report

of

GREAT RIVER ENVIRONMENTAL ACTION TEAM II

by

DREDGED MATERIAL USES WORK GROUP

James C. Case, Chairman
James E. Gonyier, Co-chairman 1980
Iowa Geological Survey
123 North Capitol Street
Iowa City, Iowa 52240

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ATTACHMENTS

I. INTRODUCTION

The Mississippi is the greatest river in North America, gathering run-off from 22 states draining 1.2 million square miles. It is the third largest watershed in the world, flowing 2,348 miles to the Gulf of Mexico. Millions of people live on its banks and draw life from its waters. Over five hundred kinds of animals live among the diverse plant communities that thrive in and along the river.

Man, in his progress, has put the river to many varied and sometimes conflicting uses. The pressures of man's use of the river are feared to be degrading the environmental qualities of the river. More information is needed on the complex interactions of the river's resources and these resource reactions to mans activities on the river. When this information is obtained, it can then be used to determine where problems exist and the alternatives available to man to solve these problems and coordinate river uses to minimize conflicts.

A. Study Authorization and Development

In response to increasing public concern for the environmental quality of the river, the Great River Study was authorized by Congress in the Water Resources Development Act of 1976 (PL94-587). This legislation authorizes the U.S. Army Corps of Engineers . . . "to investigate and study, in cooperation with interested states and Federal agencies, through the Upper Mississippi River Basin Commission, the development of a river system management plan . . .".

The total study program includes three Great River Environmental Action Teams (GREAT), which have the responsibility for the river reaches from St. Paul/Minneapolis to Guttenberg, Iowa (GREAT I); Guttenberg to Saverton, Missouri (GREAT II), and Saverton to the

confluence of the Ohio (GREAT III).

The study programs and recommendations of the three GREAT Teams will be brought together in to a river management strategy for the entire Upper Mississippi River. The goal of the study is to present to Congress and the people a river resource management plan that is, above all, realistic - a plan that is technically and economically sound, socially and environmentally acceptable, and capable of being put into action within a reasonable period of time.

B. Study Purpose and Scope

The purpose of the GREAT II Studies is to identify and resolve conflicts resulting from separate legislative actions of Congress which mandated that the Upper Mississippi River be managed in the national interest for commercial navigation and as a fish and wildlife refuge.

The concept of the study originated from a need to coordinate the maintenance activities of a nine foot navigation channel by the U.S. Corps of Engineers from Guttenberg, Iowa to Saverton, Missouri with other river uses. GREAT II was founded because of increasing concern by conservationists and the general public over the lack of information available about the impacts of U.S. Corps of Engineers channel maintenance activities on many key resources of the river.

The scope of the GREAT II Study is directed toward developing a river system management plan incorporating total river resource requirements. GREAT II was organized early in fiscal year 1977 (October 1976 through September 1977) and is studying the river from Guttenberg, Iowa, to Saverton, Missouri.

C. Study Participation and Organization

The GREAT II Team is composed of representatives from the following Upper Mississippi Basin States and the Federal River Resource-oriented agencies:

State of Illinois
State of Iowa
State of Missouri
State of Wisconsin
U.S. Department of the Interior - Fish and Wildlife Service
U.S. Department of Agriculture - Soil Conservation Service
U.S. Department of Defense - Department of the Army - Corps of Engineers
U.S. Department of Transportation - U.S. Coast Guard
U.S. Environmental Protection Agency
Upper Mississippi River Conservation Committee (ex officio)

GREAT II is organized into 12 functional work groups and the Plan Formulation Work Group. Each work group is to accomplish the study objectives as they relate to the work group's functional area and as directed by the team. Work groups are composed of persons having expertise and interest in the work groups area of study.

This report summarizes the concerns, objectives, activities, conclusions and recommendations of the work group as they relate to the GREAT II Study area.

D. Dredged Material Uses Overall Objective

The overall objective of the work group is to identify and develop ways to use dredged material as a valuable resource for productive uses. In order to realize the objective the following sub-objectives were developed:

1. Analyze and describe the constituents and properties of dredged material.
2. Determine productive uses for dredged material.
3. Determine needs for dredged material.
4. Select sites for dredged material disposal.
5. Study the legal and institutional framework regarding the placement of dredged material.
6. Conduct a study of sand and gravel producers to determine their needs for dredged material.
7. Present findings in the form of an appendix.

E. Dredged Material Uses Work Group Organization

1. Participants

The DMUWG is composed of both salaried employees and volunteer workers. The salaried positions are as follows:

1. Chairman: The duties of the chairman are to organize and conduct meetings (as needed) of the DMUWG, supervise field assistants and support staff, and prepare reports for the Plan Formulation Work Group and GREAT II Team. The chairman is also responsible for chairing and organizing meetings of the Disposal Site Selection Task Force.

2. Field assistants: One duty of the field assistants was to locate, record, and photograph potential dredged material disposal sites in the GREAT II study area. Another duty was to contact all potential users of dredged material to determine what demand exists for the material. All pertinent federal, state,county, local, and private individuals have been contacted. Another task of the field assistants was to contact all sand and gravel producers to determine both their demand for the material and what effect the availability of dredged material will have on their market.

3. Support Staff: The duties of the support staff were to process disposal site photographs, assemble all field data collected by the field assistants, and compile sets of potential disposal site maps for distribution to all the work groups.

The volunteer members and organizations are as follows:

1. Iowa Geological Survey
2. Iowa Conservation Commission
3. Iowa Department of Transportation
4. Wisconsin Department of Natural Resources
5. Missouri Department of Natural Resources
6. Rock Island District Corps of Engineers
7. Civil Engineering Department, Iowa State University
8. Various sand and gravel industry representatives
9. GREAT work group chairmen.
10. Members of Public.

2. Meetings and Voting Procedures.

Work group meetings were held infrequently. The groundwork for work to be accomplished was agreed upon at the March 15, 1978 meeting. As the work to be accomplished was straightforward few formal meetings were required after that date. Instead, as problems arose members of the work group were contacted either in person or by phone regarding possible solutions to the problem. The chairman of the DMUWG also chaired the Disposal Site Selection Task Force. In 1979, meetings were held on the average of once every three weeks.

All State, Federal, and public representatives were allowed a vote, and decisions were arrived at by consensus. As only a few

sand and gravel companies were represented, they were not allowed a vote as they did not represent the whole industry. Their input did prove to be invaluable, though.

3. Division of Responsibilities

The majority of work done by the DMUWG was by employees of the Iowa Geological Survey or Iowa State University that were funded by GREAT. Funded personnel included the following:

1. Chairman
2. Assistant, Market Study Supervisor
3. DMUWG Legal Study Personnel, 1977-78
4. Flood Plain Legal Study Personnel, 1978
5. Field-Office Personnel, 5 hired for 1978, 4 hired for 1979. Funded partially by GREAT.
6. Iowa State University Civil Engineering Graduate Student.

It is obvious that the organization of the DMUWG is not the same as other work groups. We relied mainly upon funded personnel for day to day activities and decisions and upon the expertise of the various volunteer members for overall guidance and specific technical assistance.

II. A. PROBLEM IDENTIFICATION PROCESS

Once the twelve functional work groups and their overall objectives were formulated, the work group members began to identify public concerns, use conflicts and other problems related to their overall objective and area of study. A work groups' list of problems was composed of those problems identified in any of the following ways:

1. the problem was identified in GREAT I and was applicable to the GREAT II area.
2. the particular work group recognized an existing problem based on existing conditions.
3. the particular work group recognized a potential problem based on future projections of existing conditions and trends.
4. other work groups identified concerns relating to the particular work groups' area of study.
5. the public expressed concerns and problems directly to the particular work group.
6. the public expressed concerns and problems to a particular work group through the public participation and information work group (ie. town meetings; houseboat trips; etc.).

These problems were compiled into a list to be evaluated by the particular work group for their relevancy to the study, the urgency or certainty of the problem, and the potential for resolving the problem within the time-frame of the study. Certain problems were eliminated from further study based on criteria guidelines developed by the Upper Mississippi River Basin Commission in 1974.

The list of remaining problems was then prioritized by the work groups. (See Plan Formulation Work Group Appendix for the listing of these problems.)

The results of this screening process were put into tables and displayed in the Preliminary Feasibility Report.

Once the work groups had developed a set of problems and needs, they formulated a list of objectives designed to address and, at a minimum, partially resolve their problems. These objectives were then used to identify tasks and/or studies which the work group needed to accomplish in order to identify the possible alternative solutions to their respective problems. The problems, objectives and tasks therefore represent the plans-of-action each work group use to derive their final conclusions and recommendations.

The conditions, both existing and future, which were used to identify a work group problems are discussed in the following sections. The year 1979 was chosen as a base point for existing conditions, and a project life of fifty years was used to predict future conditions. Attachments 1, 2, and 3 summarize the plan-of-action for each work group.

Attachment # 1

WORK GROUP Dredged Material Uses — PROBLEM IDENTIFICATION

1. STATEMENT OF PROBLEM (LIST IN CHRONOLOGICAL ORDER)	2. DATE IDENTIFIED	3. AGENCY, GROUP, ETC. WHO IDENTIFIED	4A. IS THE PROBLEM BEING ADDRESSED BY GREAT II?	4B. IF IT IS, BY WHICH TASKS?	4C. IF IT'S NOT, WHY NOT?
1. Dredged material in the GREAT II study area has not been adequately sampled and described. Constituents and properties need to be determined.	1977	GREAT I-II	Yes	1	
2. New productive uses have to be developed for dredged material, taking into account the unpredictable delivery time for material.	1977	GREAT I-II	Yes	IV	
3. Total river demand for dredged material is not known. Demand has only partially been determined within radius of existing dredging equipment pipeline reach.	1977	GREAT I-II	Yes	III	
4. Very few disposal sites have been used in such a manner that the material could be made available for a productive use. All existing sites are selected by considering only existing equipment limitations.	1977	GREAT II	Yes	II-VI	
5. Information has not been assembled, analyzed, and made readily available on legal restrictions or present day policies on dredge spoil transport and placement.	1977	DMUWG-GREAT II	Yes	V	

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WORK GROUP Dredged Material Uses PROBLEM IDENTIFICATION

1. STATEMENT OF PROBLEM (LIST IN CHRONOLOGICAL ORDER)	2. DATE IDENTIFIED	3. AGENCY, GROUP, ETC. WHO IDENTIFIED	4A. IS THE PROBLEM BEING ADDRESSED BY GREAT II?	4B. IF IT IS, BY WHICH TASKS?	4C. IF IT'S NOT, WHY NOT?
6. A market study is needed but is not available on sand and gravel producers for dredged material.	1977	DMUWG-GREAT II	Yes	III	
7. Productive Use: a) New and productive uses for disposal material may cut into existing free enterprise markets. b) Unpredictable delivery time for material.	1977	Dredged Material Uses			
8. Determine needs for dredged material: should equal study emphasis be given to all portions of the river even though in some areas dredging has never occurred within ten miles of a specific location.	1977	Dredged Material Uses	Yes	1,4,5	--
9. Legal Study: Many legal problems may arise if new uses are found for dredged material. There may be difficulties in disposing of material on private, county, or state land.	1977	Dredged Material Uses	Yes	3	--
10. Use dredged material to build road on river side of tracks in Cassville.	August 1978	Public	Yes-partially	5	Addressed in Plan Form--by On-Site Inspection Team--too costly to put material there.

Attachment # 1

WORK GROUP Dredged Material Uses PROBLEM IDENTIFICATION

1. STATEMENT OF PROBLEM (LIST IN CHRONOLOGICAL ORDER)	2. DATE IDENTIFIED	3. AGENCY, GROUP, ETC. WHO IDENTIFIED	4A. IS THE PROBLEM BEING ADDRESSED BY GREAT II?	4B. IF IT IS, BY WHICH TASKS?	4C. IF IT'S NOT, WHY NOT?
11. Sabula, Iowa - Dredge S. Side/fill N. side to expand city. Use channel fill.	August 1978	Public	Yes-partially	5	Addressed in Plan Form by On-Site Inspection Team--would be filling in lake--can't do.
12. Need areas for dredged material where the public can get at it.	August 1978	Public	Yes	same as problem 4	--
13. Possible area for material placement between Dallas City, Il. and Niota--possibly good area for recreational development.	August 1978	Public	Yes-partially	5	Will be addressed in Plan Form as possibly part of Channel Maintenance Plan.
14. Eastern Iowa Power has problem with sediment at docks--barges cannot get in. They don't know what to do with material that is dredged.	August 1978	Public	Yes	1,3,5	--
15. The Quincy Park District can use all the spoil from dredging that becomes available. We have many sites to suggest.	August 1978	Public	Yes-partially	5	Will be looked at by On-Site Inspection Team--addressed at Plan Form.
16. Why not put dredged material on drainage levys to help protect the district in times of high water?	August 1978	Public	Yes	5	--

Attachment # 2

DREDGED MATERIAL USES

WORK GROUP OBJECTIVES

OVERALL OBJECTIVE: Identify and develop ways to use dredged material as a valuable resource for productive uses.

SUB-OBJECTIVES:

1. Analyze and describe constituents and properties of dredged material.
2. Determine productive uses for dredged material.
3. Determine needs for dredged material.
4. Selection of sites for dredged material disposal.
5. Study the legal and institutional framework regarding placement of dredged material.
6. Conduct a study of sand and gravel producers and quarry operators.
7. Complete draft appendix.

Attachment # 3

WORK GROUP Dredged Material Uses FORMULATION OF TASKS

DESCRIPTION OF TASK	PURPOSE OF TASK	PERSON(S) OR GROUP(S) RESPONSIBLE FOR COMPLETION OF TASK	PROBLEMS ADDRESSED BY TASK	ANTICIPATED COMPLETION DATE OF TASK
#1. MARKET STUDY	Study sand & gravel producers and consumers to see if they can use dredged material and set up schedule for use if they can use product: set of maps showing demand.	Iowa Geological Survey - Contract	1,2,3	August 1979
#2. ANALYZE AND DESCRIBE CONSTITUENTS AND PROPERTIES OF DREDGED MATERIAL.	Data will be used to aid in determining whether dredge material can be used in construction (in connection with aggregate study).	Iowa Geological Survey and Iowa State University	2	completed
#3. LEGAL STUDY	To determine & identify state and federal restrictions regarding placement of dredged material; to determine interaction of state and federal laws.	Iowa Geological Survey - Susan Steward	6,9	completed
#4. AGGREGATE STUDY	To determine productive uses for dredged material--(ie. especially in construction).	Iowa State University - Contract	2,8,12	completed
#5. PRELIMINARY DISPOSAL SITE SELECTION	Pool by pool examination to select all possible dredge material disposal sites--look for sites in conjunction with other work group concerns--also maximize beneficial use.	DREDGE MATERIAL USES WORK GROUP	4,8,10,11, 13,14,15, 16	completed

Attachment # 3

WORK GROUP Dredged Material Uses FORMULATION OF TASKS

DESCRIPTION OF TASK	PURPOSE OF TASK	PERSON(S) OR GROUP(S) RESPONSIBLE FOR COMPLETION OF TASK	PROBLEMS ADDRESSED BY TASK	ANTICIPATED COMPLETION DATE OF TASK
#6. FINAL DISPOSAL SITE SELECTION	Review all possible sites chosen in preliminary disposal selection and synthesize these sites with the demands shwon in the market study and insure equipment can reach.	DREDGE MATERIAL USES WORK GROUP - DISPOSAL SITE SELECTION TASK FORCE		ongoing
#7. WORK GROUP MEETING AND DISCUSSIONS				ongoing

B. 1979 Conditions

1. Existing Uses of Dredged Material

Dredged material has historically been used for various purposes in the Rock Island District. Due to equipment and transport capability limitations most dredged material has been deposited in such a manner as to create beaches either on islands or the banks of the river. In most cases the material is accessible only by boat. In a few cases, notably at LaGrange and Palmyra, Missouri, the material has been made available at a site that can be accessed by car or truck. The uses there have been expanded to include road sanding and fill for construction. Material has been dredged from the main channel to be used in the construction of levees, but it was not a direct result of channel maintenance dredging.

2. Existing Demand for Dredged Material

The RID Corps of Engineers has been receiving requests for dredged material for a number of years. Most of the requests are either for very small quantities of material or for projects that need material at a specific time. Due to the relatively large volumes of material dredged at each site, material transport limitations, and the inability to accurately predict when and where dredging will occur, very few of the requests have been satisfied. In some cases, present day Corps policy regarding placement of material would prohibit or deter making material available as it would have to be put up for bid or sold. In other cases, many request sites were not acceptable for dredged material disposal. A pool by pool breakdown of dredged material requests over the

last 15 years is presented below (* indicates request satisfied):

Pool 11

1975 Dubuque Co. Engineer Highway Department

Pool 12

1968 East Dubuque - Fill on river front

1968 Jackson Co. Conservation Board - Boat ramp at Bellevue

1968 Private request - Riverview park

1969 Private request - Sand bar creation above L/D 12

1974 Private request - Stumpfs Island

1976 City of Dubuque - Island at end of 16th Street

Pool 13

Jackson Co. Conservation Board - Portions of Sabula Lake

Pool 15

1966 Bettendorf Park Board, City of Davenport - Dynamite Island

1972 Bettendorf and Rock Island County Park Boards - Material on Kay Island

1974 Davenport Levee Improvement Commission - Enlarge Dynamite Island.

1974 Spencer Island Owner

1975 Campbell Island Owners - Fill in backwaters.

Pool 18

1967 City of Galesburg - Well site near Oquawka

1971 Private request - Material to stop bank erosion near Henderson River.

1973	Keithsburg - Fortify levee
1975	Des Moines Co. Soil Conservation District - Build up levee.
1975	Henderson Drainage District # 3 - Maintain levee
1975	Cascade Boat Club
1975	Private request - Beach maintenance on island 394
	Pool 19
1963	Private request - Fill low areas near Keokuk
1965	Private request - Fill lot near Burlington
1970	Burlington City Manager - Material on Otter Island
1972	West Point Boat Club - Beach creation
1974	Private request - Fill old Burlington Basket Co. property
1975	City of Burlington - Fill near R.M. 404.4-404.7
1975	Des Moines Co. Engineer - Stockpile sites in county
1975	Burlington Sportsmans Club - Near Sullivan slough
	Pool 20
1974	Keokuk - Fill for sewage treatment plant
1974	Canton - Fill borrow pit near river
	Pool 21
1965	Illinois Dept. of Conservation
*1967--Present	LaGrange - sand on west bank
1976	Quincy park district
1978	Quincy park district

Pool 22

*1965	N.E. Mo. Electric Power Coop - Stockpile used by City of Palmyra, Marion Co., and South River Drainage Dist.
1970--Present	Private - Material to stop erosion on Cottel Island
1972	Hannibal Chamber of Commerce - Sand bar at R.M. 310.7
1973	Sny Levee Drainage District - Maintain Levees
1974	Private - Material near Whitney Island

3. Existing Location of Disposal of Material

Dredged material disposal sites that have been utilized by the RID Corps over the last twenty years are listed below with a short description of the general land use at each site.

Pool	Site	Location (River Mile)		Land Use
11	HD 1	596	RDB	Beach
	HD 2	599	Hurricane Island	Beach
	HD 3	603.3	Island	Beach/Wooded
	HD 4	604.9	Sweezy Island	Wooded
	HD 5	605.2	Island	Wooded
	HD 6	608.3	RDB	Wooded
	HD 7	608.9	Island 189	Beach
	HD 8	609.9	Island	Beach/Wooded
	HD 9	610.5	Island 189	Beach/Wooded
	HD 10	612.5	Island	Wooded
	HD 11	612.9	Island	Beach/Wooded
	HD 12	613.5	Goetz Island	Beach/Wooded

	HD 13	614.2	Goetz Island	Beach
12	HD 1	560.7	Island	Wooded
	HD 0	566	Open Water	
	HD 2	567.9	RDB	Wooded
	HD 3	568.6	RDB	Wooded
	HD 4	572.5	Nine Mile Island	Beach/Wooded
	HD 5	579.8	LDB	Beach/Wooded
	HD 6	581.5	Island	Beach
13	HD 16	525.5	Open Water	
	HD531.4	531.4	Island	Beach
	HD 18	532.6	LDB	Wooded
	HD 17	532.8	LDB	Wooded
	HD 1	533	Island	Wooded
	HD 2	533.3	Island	Beach/Wooded
	HD 2'	533.5	Island	Beach/Wooded
	HD 3	533.5	Island	Beach/Wooded
	HD 4	539.4	Island	Beach/Wooded
	HD 19	541	Open Water RDB	
	HD 20	541.1	Island	Beach/Wooded
	HD 5	544.5	RDB	Beach/Wooded
	HD 24	545.5	RDB	Wooded
	HD 23	545.7	RDB	Wooded
	HD 22	545.8	RDB	Wooded
	HD 21	546	RDB	Wooded
	HD 26	546.1	RDB	Wooded
	HD 6	546.2	RDB	Wooded
	HD 29	546.7	RDB	Wooded

13	HD 30	547	RDB	Wooded
	HD 25	547.1	Island	Wooded
	HD 10	547.3	Island	Beach
	HD 31	547.4	RDB	Wooded
	HD 7	547.5	RDB	Wooded
	HD 11	547.7	Island	Beach/Wooded
	HD 8	547.9	RDB	Wooded
	HD 9	548.1	RDB	
	HD 12	549.7	Casey's Island	Wooded
	HD 28	550.4	RDB	Beach/Wooded
	HD 27	550.5	RDB	Beach
	HD 14	550.8	RDB	Wooded
	HD 13	551	Island	Beach
	HD 15	552.8	RDB	Beach/Wooded
	HD554.6	554.6	Island	Beach
14	HD 1	493.7	Island	Wooded
	HD 2	494	Island	Beach/Wooded
	HD 3	494.5	Open Water RDB	
	HD 71	494.6	Open Water RDB	
	HD 4	503.3	Island	Wooded
	HD 5	503.5	Island	Beach/Wooded
	HD 6	503.8	Island	Beach/Wooded
	HD 7	504	Island	Beach
	HD 8	506.1	Island	Wooded
	HD 66	508.7	Island	Wooded
	HD 9	509	Island	Beach/Wooded
	HD 10	509.2	Island	Wooded

14	HD 59	509.7	Open Water RDB	
	HD 65	510	Island	Wooded
	HD 64	512.9	Beaver Island	Wooded
	HD 11	513.9	Beaver Island	Beach
	HD 13	514	LDB	Beach
	HD 12	514.2	Albany Island	Wooded
	HD 14	514.3	LDB	Commercial
	HD 15	516.2	Island	Wooded
	HD 55	516.6	Beaver Island	Wooded
	HD 16	517.2	Beaver Island	Wooded
	HD 17	517.4	RDB	Wooded
	HD 18	518.6	Island	Beach/Wooded
	HD 19	518.7	RDB	Public Park
	HD 66	519.2	LDB	Beach/Wooded
15	HD 4	489.5	Open Water LDB	
	HD 3	489.8	Winnebago Island	Beach/Wooded
	HD 2	491	Open Water RDB	
	HD 1	491.2	Kay Island	Beach/Wooded
16	HD 1	461.5	Island	Beach/Wooded
	HD 2	469.2	RDB	Beach/Wooded/Corn
	HD 3	469.4	Andalusia Island	Beach/Wooded
	HD 4	472.4	RDB	Beach/Wooded
	HD 5	473	Island	Beach/Wooded
	HD 6'	481.5	LDB	Rocky Beach
	HD 6	482.6	Arsenal Island	Beach/Wooded
17	HD 1	446.3	Kilpeck Island	Beach/Wooded
	HD 2	447.5	Kilpeck Island	Beach/Wooded

17	HD 3	447.8	Bass Island	Beach/Wooded
	HD 4	448	Bass Island	Beach/Wooded
	HD 5	448	RDB	Beach/Wooded
	HD 6	451.4	Island	Wooded
	HD 7	451.9	Island	Wooded
	HD 8	453.1	Island	Beach/Wooded
	HD 9	453.5	Muscatine Island	Wooded
	HD 10	454.4	Muscatine Island	Wooded
18	HD 1	411.7	Dasher Island	Wooded
	HD 2	414.9	Long Island	Beach/Wooded
	HD 3	419.3	Benton Island	Beach
	HD 4	420	Camp Island	Wooded
	HD 5	420.3	Johnson Island	Wooded
	HD 7'	424.2	LDB	Beach/Wooded
	HD 6	424.4	Island	Beach/Wooded
	HD 7	424.5	Snipe Island	Beach
	HD 8	425.5	Willow Bar Island	Beach/Wooded
	HD 9	427.2	LDB	Beach/Wooded
	HD 10	427.2	Blackhawk Island	Beach/Wooded
	HD 11	431.4	Island	Wooded
	HD 11'	431.5	LDB	Housing
	HD 434	434	Island	Beach
19	HD 390	390	RDB	Beach/Wooded
	HD 394	394	Is. and Open Water	Beach/Wooded
	HD 2	399.2	Craigel Island	Beach/Wooded
	HD 3'	399.8	Craigel Island	Wooded
	HD 3	400	Is. and Open Water	Beach

19	HD 4	400.2	Is. and Open Water	Wooded
	HD 5	401.4	Burlington Island	Wooded
	HD 6	401.5	RDB	Beach/Wooded
	HD 10	404.5	Island	Beach
	HD 11	405	Island	Beach
	HD 7	405.1	Island	Beach/Wooded
	HD 8	405.3	Baby Rush Island	Beach/Wooded
	HD 9	406	Willow Bar Island	Beach
	HD 13	406	Baby Rush Island	Beach/Wooded
	HD 14	406.2	Big Rush Island	Beach/Wooded
	HD 12	406.4	LDB	Wooded
	HD 15	407	Otter Island	Beach/Wooded
	HD 17'	407.8	LDB	Wooded
	HD 17	408	Island and LDB	Beach/Wooded
	HD 16	408.2	Otter Island	Beach/Wooded
20	HD 2	343.6	RDB	Wooded
	HD 1	343.8	RDB	Beach/Wooded
	HD 7	349	RDB	Wooded
	HD 6	349.3	Buzzard Island	Beach/Wooded
	HD 5	349.6	Buzzard Island	Wooded
	HD 4	349.7	Buzzard Island	Beach/Wooded
	HD 3	350	Buzzard Island	Beach
	HD 11	350.9	Buzzard Island	Wooded
	HD 12	351.5	RDB	Wooded
	HD 13	351.6	Island	Wooded
	HD 9	355	Fox Island	Beach

20	HD 8	355.5	Fox Island Bar	Beach
	HD 10	361.4	Island	Beach/Wooded
	HD 10'	361.6	Island	Wooded
21	HD 1	326.8	RDB	Wooded
	HD 2	327.5	Bay Island	Beach/Wooded
	HD 3	328.1	Bay Island	Beach
	HD 4	328.2	RDB	Wooded
	HD 5	331.5	Hogback Island	Beach/Wooded
	HD 6	332.4	Willow Island	Wooded
	HD 7	332.5	RDB	Wooded
	HD 8	333.5	Long Island	Wooded
	HD 9	336	LaGrange Island	Wooded
	HD 11	336.2	RDB	Beach/Wooded
	HD 10	336.7	LaGrange Island	Wooded
	HD 12	337.2	Long Island	Wooded
	HD 13	388	RDB	Wooded
	HD 14	338.2	Long Island	Wooded
	HD 15	339	Long Island	Beach/Wooded
	HD 16	340.3	Long Island	Wooded
	HD 17	341.5	Open Water LDB	
	HD 17'	342.2	Open Water	
22	HD300.4	300.4	RDB	Beach/Wooded
	HD300.5	300.5	Cottel Island	Wooded
	HD 1	302.2	RDB	Beach/Wooded
	HD 1'	303	Open Water LDB	
	HD 1"	303.1	RDB	Wooded
	HD 2	311.5	Zeigler Island	Wooded

22	HD 3	311.8	RDB	Wooded
	HD 4	312	Island	Wooded
	HD 5	313.2	Armstrong Island	Wooded
	HD 6	313.3	RDB	Wooded
	HD 7	314.2	Island	Wooded
	HD 8	314.3	Whitney Island	Wooded
	HD 9	316.1	Whitney Island	Wooded
	HD 10	316.3	LDB	Beach/Wooded
	HD 11	316.6	Beebe Island	Beach/Wooded
	HD 12	319.8	Goose Island	Wooded
	HD 13	323.8	Is. and Open Water LDB	Wooded

4. Existing Knowledge of Dredged Material Uses

A listing of known uses of RID dredged material and a description of each are given below.

a. Beach creation or nourishment

The material being dredged is generally a clean, uniformly graded medium grained quartz sand. All sands tested were free from organic impurities, and the sand shape ranges from sub-angular to subrounded. In other words, the sand is ideal for beach creation or nourishment and has been used as such as long as the channel has been dredged.

b. Construction fill

Material dredged from the main channel has been used in very few instances for construction fill. It has not been used as such for a number of reasons:

1. Equipment limitations - Not being able to deliver material to the use site.

2. Other sources of material - In many segments of the river, especially the southern portion of the RID, sand is plentiful and as such can be delivered to a site at relatively low cost. Only when dredged material can be made available free of charge and delivered close to the construction site could it be widely utilized in these areas.

3. Lack of Knowledge - Many people in the river corridor have not known about the availability of dredged material and as such have not tried to find uses for it.

c. Road Sanding - Ice Control

Channel maintenance dredged material has been used successfully in both the GREAT I and II areas as road sanding material. In the GREAT II area the city of Palmyra and Marion County, Missouri, have been using dredged material for sanding roads for a number of years with great success. All sand dredged in the study area is suitable for sanding roads.

d. Levee Construction or Repair

Paul Schwartz's 1976 University of Iowa thesis on "Anaïysis and Performance of Hydraulic Sandfill Levees" documents the fact that levees can be constructed from dredged sand, and in fact they have been constructed as such for years. Few if any levees have been constructed in conjunction with channel maintenance dredging in the RID. The reasons for this are as follows:

1. On the average, a variable percentage of solids (0-20%) occurs in the slurry during channel maintenance dredging

wheras a consistent 20% solids slurry is usually required to build a levee. The excess of water at times erodes more of the levee than it replaces. Unless depth of dredging is increased to give a greater face of cut and resulting greater percentage of solids in the slurry, levee construction is not suited to channel maintenance dredging with the 20 inch dredge Thompson under current dredging practices. In the St. Louis District, levees have been repaired during channel maintenance dredging. In that district, greater quantities of material are usually dredged and the face of cut is large enough to give a greater percentage of solids and a more consistent slurry.

2. Material transport limitations - Present hydraulic transport capability of dredged material is approximately one mile in the RID, which is not sufficient for levee construction.

3. Volume of material - Great quantities of material are required to construct a sand fill levee. Unless material was to be stockpiled over a period of years and then a levee constructed, only short segments at a time could be built.

4. Return water - Dredged material has been stockpiled in front of or behind existing levees in a number of locations. When the material has been placed behind the levee there have been problems with removing the excess water. In order to rectify the problem diked areas will have to be construcced against the levees and the excess water will have to be pumped from the contained area back into the river.

e. Concrete Aggregate

A GREAT I study by the Department of Civil Engineering, University of Wisconsin-Platteville, undertook a preliminary study to determine the feasibility of using dredged sand as a portland cement concrete fine aggregate. The sand was shown to be adequate for construction of sidewalks, patio slabs, outdoor decorations, etc., but not for applications where strength is a limiting factor. The GREAT I DMUWG has recommended that the dredged material be used to make concrete riprap.

In Wisconsin dredged sand has been used as a blending sand in asphalt for some portions of State Highway 35, but has not found widespread use as such. As stated in the GREAT I DMUWG Appendix, Wisconsin will accept the material as a blending sand for asphalt concrete and Iowa could use some of the material at times.

A few sand and gravel companies are dredging for sand and gravel in the Mississippi River, but not in the main channel. The sand they are dredging is being used for fill, road sanding, portland cement concrete aggregate, asphaltic concrete aggregate, and mortar sand. The companies are dredging under more controlled conditions and the gradations are not necessarily the same as channel maintenance dredged sand. Some companies have used sand from historical disposal sites, and historic dredging sites.

f. Soil Conditioner

The DMUWG in GREAT I conducted a study to determine if dredged material could be mixed with a sewage sludge and sawdust

compost in order to create a useful soil additive from waste materials. As stated in their Appendix the study concluded that adding sand to the compost improved the material's physical properties. Placing compost on top of dredged material and mixing it with the top 2 to 3 feet of sand will improve the moisture holding capability and moisture content of the soil, thus increasing the revegetation potential.

5. Existing Regulations Which Affect Material Disposal and Use

An attempt will be made to cut through a part of the confusion surrounding the myriad of policies, rules, and regulations that directly affect dredged material disposal and use. This will be done by looking at present day corps policies, reuseable vs. non-reuseable sites, pertinent Federal regulations, and pertinent State regulations.

a. Present day Corps policy

The Dredged Material Uses Work Group has the following understanding of the present day Corps policy concerning the various methods of disposal of dredged material that will result in a productive use of the material:

1. Within the limits of the hydraulic dredge
    a. If dredged material is made available to a public body, there will be no Corps charge or royalty if the material is used by the public body and not sold to a private enterprise.
    b. If a private enterprise is interested in the dredged material and the sand is deposited such that it is accessible to an industry that requested

it, the material will be put up for bid with the highest bid obtaining the material.

c. If a private enterprise will supply a disposal area that will enable the Corps to dispose of material in a more economical manner than they would normally be able to, there is no charge for the material, and the material will not have to be put up for bid.

2. Extra transport of material

a. Private and public: If due to a request for dredged material the sand is transported beyond a distance that would be considered normal and at a cost greater than would be incurred by disposal at a non-beneficial use site, the public body or private enterprise has to pay for the extra cost of transport of the material.

b. If states impose beneficial dredged material uses as permit conditions, any additional expense associated with such provision will be the responsibility of local interests.

c. If a state require on-land disposal, the state or a local interest has to provide a suitable disposal area. The Corps will assume the increased dredged material handling costs associated with placing the material in the furnished site.

d. Some states may insist on removed from flood plain disposal; in that event, the state will be advised that it will have to furnish a disposal site and the increased cost of transport to that site if

the material is not polluted according to EPA standards. If it is, the COE must pay all costs in order to remove it from the flood plain.

b. Reuseable vs. Non-reuseable sites

A reuseable site is defined for the purposes of GREAT as a temporary stockpile site from which the material would have to be removed between dredging occurrences in order to supply adequate capacity for further disposal. A non-reuseable site is a stockpile site from which material does not have to be removed to supply adequate capacity for future disposal. An assumption is made that productive uses will be found for the material that must be removed from the temporary stockpile site while this may or may not be the case for the non-reuseable site. As defined in Dredged Material Research Program (DMRP) Technical Report D-78-22 "Development of Procedures for Selecting and Designing Reuseable Dredged Material Disposal Sites" by Raster, Gill, Stenernagel, and Lipiro, "the ultimate fate of dredged material at a non-renewal disposal site need not concern the District. If material from a privately owned non-reuseable disposal site finds its way to the marketplace, that is at the option of the landowner and does not involve the District." Again, there has to be the assumption that extra costs of dredging and disposal of the material do not result from going to a private site over another acceptable public or federal site, for if they do then extra costs have to be assessed to the beneficiary of the material.

If material goes to a federal or public reuseable site and from there to beneficial users then the policy as defined by

DMRP Report D-74-7 "Legal, Policy, and Institutional Constraints Associated with Dredged Material Marketing and Land Enhancement" by Wakeford and Macdonald, states that "material disposed of to other than governmental tax-supported or non-profit organizations must be sold at its fair market value." If the users are a federal, state, or public body, the material is made available free of charge, but if extra dredging and disposal costs are associated with making the material available, the costs have to be paid by the beneficiaries.

No attempt has been made before 1979 to determine the fair market value of dredged material. The DMJWG feels that a demand has existed for dredged material assuming it would be made available free of charge. It is doubtful that the material would be purchased at a price similar to what is being charged by private enterprise. It is possible that fair market value can be determined only by putting all dredged material that will go to a productive use up for bid.

Material that goes to a private reuseable disposal site, assuming the site can be disposed of at a lower cost than other acceptable sites, can be sold, given away, or left in place as the Corps has usually acquired disposal rights only. A question that remains unanswered is one of definition of private sites. Are all sites made available by sand and gravel companies to be considered reuseable even though they may be large enough to hold all the material that could be dredged in 50 years from a particular dredge cut?

c. Pertinent Federal Statutes

All information relating to federal statutes has been taken from a DMUWG report by Susan Stewart entitled "State and Federal Restrictions on Dredge Soil Placement in the Upper Mississippi River Area." A complete report is available through the Iowa Geological Survey (IGS Office). A summary of the statutes follows:

The Resource Conservation and Recovery Act of 1976

Currently, none of the five states surveyed restricts the placement of dredge spoil through its solid waste laws, although litigation is pending between the COE and Wisconsin on this point. Generally, although the definitions of "solid waste" in the statutes could be construed to encompass dredge spoil, the states have not chosen to interpret them in that manner.

A recent federal statute may force a more active state role in solid waste disposal. The Resource Conservation and Recovery Act of 1976, PL 94-580, authorized federal funds for the development and implementation of state solid waste plans. For a state plan to be approved by the EPA (and approval is necessary to the procurement of federal funds), it must prohibit the establishment of new open dumps, and require the disposal of all solid waste in sanitary landfills or in some other environmentally acceptable fashion.

Since solid waste is broadly defined, it seems likely that EPA intends to have state plans include provisions covering dredge spoil disposal. The Resource Act contains a section requiring federal facilities to comply with all substantive and procedural state requirements. Therefore, it seems likely

that in the future, the Corps will have to comply with state law pertaining to the disposal of solid waste.

Flood Plain Management Executive Order 11988

At the same time that he made an Environmental Message, President Carter issued an executive order (EO) restricting development in flood plain areas. The EO will affect the activities of federal agencies.

Basically the EO prohibits federal activities on flood plains unless the agency makes a formal finding that there is no practicable alternative to the development. The standards used for flood plain development are to be those required of local governments under the National Flood Insurance Program. The EO defines flood plains as the area subject to a one percent or greater chance of flooding in any year.

Agencies will not easily be able to get around the EO by claiming they have no alternative. The EO requires the agencies to develop administrative and public review procedures to incorporate consideration of flood plains in their project to review processes. At a minimum, agencies are required to consider alternatives to avoid adverse effects and incompatible development in the flood plain areas. If the flood plain location is still selected, the agency is required to modify its action in order to minimize harm to the flood plain and to circulate a notice explaining why the flood plain site was chosen. Budget requests must state whether the EO has been complied with. These requirements will ensure that the agency develop a record on each project.

The scope of the EO does not include federal facilities. Consideration of flood plain management is required in agency development of land and water resource programs. Agencies which conduct regulatory and assistance programs must follow the Flood Insurance Program standards in granting federal licenses and benefits.

Althouth the EO does not prohibit the use of flood plains for federal activities, it will require a careful written justification for such an action, evidencing consideration of alternatives. The goal of the EO is to ensure that flood plains will be used for minimal impact purposes that can be subjected to periodic innundation, such as for agriculture, recreation, and fish and wildlife habitat. In light of this goal, it is likely that the Corps will not be able to deposit dredge spoil in flood plain areas unless it is to be used for one of these purposes.

The Amended Clean Water Act of 1977 and its Effects on Dredging

Dredge spoil placement criteria has been in a state of flux since enactment of the Federal Water Pollution Control Act of 1972. The latest legislative change occurred in December 1977 when President Carter signed the amendments to the Clean Water Act (CWA). It substantially revised Section 404 dredge permit procedures. It is difficult at this time to do more than outline the requirements of the new CWA. Unfortunately, there is no clear legislative history to indicate what Congress' intentions were in passing the law. Also due to the short time since enactment there is minimal judicial history.

Section 404 of the CWA will have two primary effects on the Corps: 1) it enables states to set up their own dredge permit systems with the approval of the EPA, and 2) once a state permit system is established, it takes the lead role in the program out of the Corps' hands and give it to the EPA in consultation with the Corps and the Fish and Wildlife Service. Although the states are not required to establish their own programs, their requirements on dredged material disposal have had a significant impact. A study commissioned by the Corps indicated that 47 states were willing to establish their own dredging permit programs. However, these states would require federal funding and a State substitution for federal authority before they could establish such programs. No state to date has been given approval for a State 404 program.

The new permit program is modeled after the National Pollutant Discharge Elimination System (NPDES), which has been in effect since 1972. Currently, only half the state have their own NPDES systems.

The conference report makes it clear that the new section 404 is not a delegation of federal authority to the states, or, in other words, the states are not to become little EPA's or Corps. Instead, for a state to administer a dredge permit program, it is required first to pass an enabling act for the program. A state dredge permit program operates in lieu of a federal program. (Conf. Report, p. H12720).[1]

[1]References herein to Conf. Report are to the Conference Committee Report on the Clean Water Act, published in the December 7, 1977 issue of the Congressional Record.

Additionally, there is language in the act which requires the EPA and the state to defer to the Corps' judgment when a pemit may impair navigation. (404h1F; 404t).[2] It is apparent that the new act will work substantive change on Corps activities. Minnesota v. Callaway, which upheld the Corps' authority over dredging, is in practice overruled by the CWA due to the fact that the Corps has to obtain state permits. It (CWA) does require the Corps to obtain all applicable state and local permits for the discharge of dredged or fill material.

Under the new act, the Corps will continue the current program until a state program is certified. The Corps' program is changed to the extent that it can now statutorily issue general permits for a maximum 5-year term for activities that have minimal environmental impact. (404 e 1). Certain activities are not statutorily exempted from the permit requirement: farming, the maintenance of structures in the water, the construction and maintenance of farm ponds and drainage ditches, the construction of sedimentation basins, and farm and mine road construction (404 f 1).

States have the option under the new act of establishing their own permit systems. Although a separate program, it is modeled after the National Pollutant Discharge Elimination System. The Corps' and the Fish and Wildlife Service's (FWS) roles in this new system are advisory; the EPA approves the

[2]References herein to section numbers are to the appropriate section of the CWA, PL 95-217.

state program and the issuance of permits after consulting with the Corps and the FWS. One of the abuses Congress was trying to remedy in setting up this procedure was to ensure that the FWS have an early, affirmative role in the permit process, and that all the agency recommendations be written, instead of verbal. (Conf. Report, p. H12720). The state program is required to meet at least the criteria of the Corps' program before it may be approved. The Corps and FWS role is only to determine whether the state program meets these criteria, the statute states that the EPA must approve any state program that meets those criteria.

One of the criteria that a state program is required to meet is that a procedure must be established to run all permits by the Corps to ensure they will not impair "navigation and anchorage." (404 h 1 F). This is a significant retention of power by the Corps.

The EPA has the power to revoke a state program if it is not administered properly, it may order a permit revised by a state; and it may issue a permit itself if the state does not issue a reviwed permit. (404 i; 404 j).

EPA may exempt, by rule, categories of discharges from compliance with 404 procedures. (404 1).

A narrow exemption to 404 occurs for federal construction authorized by Congress, if an environmental impact statement which discusses the effects of such discharge has been prepared and submitted to Congress prior to its authorization of funds for such project. (404 r). This is actually only a narrow

exemption, recognizing the separation of powers doctrine. The rationale behind it is that if EPA struck down a Congressionally-authorized project, nullification by an executive agency would occur. (Conf. Report, p. H12720).

States and interstate agencies (but not local authorities) are authorized to set more stringent limits for dredge spoil dischargers, including federal installations. Here, also, when these more stringent standards are set, the Corps, as the guardian of navigation has the last word. It is interesting to note the difference in wording in the two statutes that defer to the Corps' power over navigation. EPA's permit requirements, which establish a base line for state programs, may not impair "navigation and anchorage." (404 h 1 f). Any more stringent state standards may not impair the Corps' authority to "maintain navigation." (404 t). Under this wording, it is possible that an EPA standard could be set so as to impair the maintenance of any navigation, but not navigation itself. This statutory conflict can only be resolved by subsequent judicial decision.

IF 404 were the only pertinent section of the CWA, it would seem to be clearer that the Corps would continue to have the final say in dredging; however, in section 313 of the CWA, Congress affirmed that all federal activities are to comply with all state, interstate, and local requirements for the control of discharges. There is no language in section 313 which defers to the Corps in navigation activities. Therefore, the issue becomes whether section 313 or 404 applies to Corps activities. Section 313 does not exclude 404 activities from its scope;

looking to the statutory language of 313 itself, one would think it overrode section 404t. However, the legislative history indicates that 404 is controlling for dredging activities.

In the conference report, the amendments to sections 313 and 404 are discussed together under the heading of federal facility compliance. (Conf. Report, p. H12717). The changes in 313 are discussed; then the changes in 404 are distinguished. The parallel consideration of the two provisions in the legislative history leads to the conclusion that they are mutually exclusive, although this is by no means the way a court would interpret the provisions.

There is an additional untested loophole in the amended CWA. Section 208 of the Act requires the development and implementation of areawide waste treatment management plans. The states are required to prepare plans and develop a regulatory program to control non-point source discharges. The plan is then submitted to the EPA for approval. When EPA approves a state 208 program which contains provisions to regulate the placement of dredged spoil, the state can cease their 404 permit program. Therefore the 208 plan can operate in lieu of a state permit program.

A 208 program must meet several criteria before it will be allowed to replace a 404 program. It must include: 1) a consultation process between state agencies, including the state fish and wildlife agency, 2) a process to identify and manage spoil placement which is compatible with 404,

3) a process to ensure that placement complies with 404 and provisions of the CWA dealing with toxic discharges, 4) a procedure that ensures that violative practices will not be allowed, and 5) a process to assure coordinated federal-state water planning and cooperation with the National Wetlands Inventory. (208b4B).

In summary, now states may establish dredging permit programs that comply, at a minimum, with Corps criteria. The Corps may "veto" any requirement of EPA, a state, or an interstate agency that will impair navigation. The real issue, which is not at all clear, is the real intent of the Anderson amendment. This is an issue that will only be resolved by litigation.

d. Pertinent State Statutes

All information relating to state statutes has been taken from the DMUWG legal study. A summary of the state statues follows:

WISCONSIN

Although both Wisconsin and Minnesota have complex laws that affect dredging, there are probably more layers of laws in Wisconsin than in any other state. To dredge, the state dredge permit process must be compiled with, permission must be obtained from the state water quality department, the Wisconsin Environmental Protection Act must be complied with, and permits must be obtained from the county for shoreland and flood plain activities. All of these laws are actively enforced--all but one of the river area towns have enacted flood plain ordinances.

Permeating the environmental law of Wisconsin is the "public trust" doctrine, which views the state as the trustee of all navigable waters for the public benefit. In that capacity, the state may sue someone who interferes with waters, or a person may sue when he does not feel that state actions are proper.

Wisconsin has had more litigation of environmental issues than any other state in the study area. Wisconsin challenged the Corps' dredging operations and won on the basis that the Corps had not complied with the National Environmental Policy Act's (NEPA) environmental impact statement (EIS) requirements.

Jurisdiction Over Waters and Adjacent Lands

In Wisconsin, the riparian owns to the center of a navigable or non-navigable stream, except when the stream in question is the Mississippi. [James v. Pettibone, 2 Wis. 509 (1893)]. The riparian who owns land along the banks of the Mississippi owns to the center line of the main navigable channel, since the Wisconsin-Minnesota and Wisconsin-Iowa boundaries are usually the center of the main channel of the river. [Franzini v. Layland, 120 Wis. 72, 97 N.W. 499 (1903); Wis. Const. Art. 2, Sec. 1]. Wisconsin espouses a strong public trust doctrine, whereby the state is held to maintain the beds and all navigable streams in trust for its citizens. As a result of the public trust, the Wisconsin Supreme Court has stated that "the state holds the beds underlying navigable waters in trust for all its citizens, subject only to the qualification that a riparian owner . . . has a

qualified title in the stream bed to the center thereof." [Muench v. Public Service Commission, 261 Wis. 492, 53 N.W. 2d514 (1952)]. Bed ownership is, in essence, a concession by the state to the riparian. [Franzini v. Layland, 120 Wis. 72, 97 N.W. 499 (1903)].

The rights of the public which are protected by the public trust doctrine are very broad. Courts have expanded the public interest in navigable waters to include the right to engage in commercial navigation.

Direct Constraints on Dredging

A permit is required for the removal of any material from a navigable stream bed and for dredging in connection with stream enlargement. (30.19; 30.20). The DNR is authorized to contract for the removal of sand and gravel from state-owned land and set a price for the material. [30.20 (2)]. No royalty is charged for material removal from privately owned beds. No compensation is charged for material removal from privately owned beds. No compensation is charged when a municipality removes sand and gravel and uses it for municipal purposes. A municipal payment waiver runs for a maximum five-year period.

The state is empowered to lease public lands for material removal also. (24.39). If such a lease will not interfere with the Corps' ability to maintain navigation, the Division of Trust Lands may lease stream beds to riparian owners to make improvements for the purpose of navigation. [24.39 (4a)]. These leases are for terms of 50 years.

The leases of state-owned lands to riparians are clearly subject to the Corps' authority over navigation. The statute provides that these leases are "deemed subject to other applicable laws of the U.S." [24.39 (4)i].

Water Quality Standards

It is illegal to discharge pollutants into Wisconsin waters except under the terms of a permit. (147.02). The definition of pollutant specifically includes dredged spoil, so the Corps must obtain certification from the DNR water quality division that the effluent for its dredging operations will meet water quality standards. [NR 205.03(3)]. However, the state exempts the "discharge of dredge carriage return flows" from water quality permit requirements where the dredger has a dredging permit from the DNR. (NR200.03g). No person may throw or deposit, or permit to be thrown or deposited, into any waters within the jurisdiction of the state any sand or waste material of any kind or any other substance deleterious to game and fish life. (29.29).

Obstructions in Waterways

Under the public trust doctrine, the DNR strictly regulates the placement of obstructions in navigable waters. The jurisdiction of the state over navigable waters begins on the landward side of a municipally-established bulkhead line. (30.11). The bulkhead line must conform as closely as possible to existing shorelines, but it is distinguishable from the low- and high-water marks which establish the parameters of riparian ownership.

[State v. McFarren 62 Wis. 2d 492, 215 NW 2d 459 (1974)]. In fact. it has been held that a state permit is required for any operations on the landward side of a bulkhead line, even though it may be riparian property. [63 Opin. Att'y. Gen. 445 (1963)].

The state's jurisdiction extends over obstructions placed beyond a bulkhead line or in the bed where no bulkhead line has been established. (30.12). Unless a permit has been granted or the legislature has otherwise authorized structures or deposits in navigable waters, it is unlawful to deposit any material or to place any structure upon the bed of any navigable where no bulkhead line has been established or to deposit any material or to place any structure upon the bed of any navigable water beyond a lawfully established bulkhead line. (30.12).

Flood Plain Zoning

The DNR has promulgated standards for flood plain ordinances which essentially rule out the placement of dredged spoil on floodway areas. The regulations prohibit any development that will cause a rise in the height of a regional flood of 0.1 foot or more. (NR 116.13). Even if it does not cause a flood height rise, a use that is not "in harmony with" those permitted in adjoining districts is strictly prohibited in floodways. [NR 116.13 (1)c]. However, the ordinance may allow any land usage in the floodway that has been authorized by a DNR dredging permit. [NR 116.16(8)d].

In flood fringe areas, deposition of materials is permitted, but only if it is compatible with local comprehensive plans, does not cause the regional flood height to rise more than 0.1 foot, and does not materially affect flood plain storage capacity. [NR 116.14(11)].

Shoreland Management

When the Corps places dredge spoil within 300 feet of a navigable water or in a wetland or marsh, it will have to comply with county and city shoreland ordinances.

IOWA

Jurisdiction over Waters and Adjacent Lands

The state of Iowa has jurisdiction over all navigable waters within its boundaries, and over adjacent lands to the ordinary high water mark. [O'Connor v. Sorenson, 222 Ia. 1248, 271 NW 234 (1937); 111.18]. The word "navigable" is used in the sense that the water must be or have been able to move commerce, or is susceptible to such use in the future. The ownership of the bed of navigable waters was vested in the state when it was admitted to the union [Barney v. City of Keokuk, 94 U.S. 324, 338 (1976)]. The federal government exercises paramount control over the use of water under its navigational servitude.

Property formed by artificial accretion is deemed to belong to the riparian. [Solomon v. Sioux City, 243, Ia. 634, 51 NW2d 472 (1952)].

The state's authority over navigable waters and water beds is exercised by the State Conservation Commission (ISCC) which controls all meandered streams and lakes and adjacent lands. (111.18, 106.2).

Direct Constraints on Dredging

Pursuant to its authority over the lands and waters of the state, ISCC regulates the removal of materials from state-owned lands and waters. (111.52). A permit must be obtained from ISCC for removal of sand or gravel. Permits will be awarded, after intra-agency review, if it is found that the applicant's activities will not be "detrimental to the state's interest." (111.53). A fee of 15¢ per ton of material removed is charged.

Water Quality Constraints

The Iowa Water Quality Commission, a division of the Department of Environmental Quality (DEQ), regulates the quality of public and private waters. The DEQ sets effluent and water quality standards. By law, DEQ may not set more stringent effluent standards than those proposed by the Environmental Protection Agency. (455B.32). However, effluent standards may be made more stringent if that is required to bring the quality of a stream up to water quality standards. There are no constraints on water quality standards. Therefore, it is conceivable that Iowa could prohibit Corps' dredging activities as violative of water quality standards, as Minnesota has. No water quality standards specifically limit dredge spoil discharges. The general water quality criteria could be applied to dredge spoil discharges. They prohibit discharges of any material in an amount sufficient to be "unsightly or deleterious." Other specific standards limit increases in the turbidity of a receiving water due to a point source to 25 Nephelometric turbidity units. [IAC 400-16.3(1)f]. Total allowable dissolved solids are

750 mg/l in a stream with a flow rate equal to or greater than three times the flow rate of upstream point source discharges. [IAC 400-16.3(1)g]. These standards apply to all classes of waters.

The only direct constraint placed by DEQ on dredging is the requirement of an administrative waiver of a permit.

Constraints on the Placement of Certain Obstructions in Navigable Waterways and on Flood Plains

A permit is required from the Natural Resources Council (INRC) before dredge spoil can be deposited on a flood plain or floodway. Normally, an administrative waiver is granted to such applicants, since the effect of dredge spoil disposal is considered minor in scope and not able to cause an appreciable effect in flood flows. (IAC 580.5-5.26).

Condemnation, Lease or Sale of Land to the Federal Government

The federal government is authorized to acquire and exercise jurisdiction over all lands of Iowa. (1.4). Such land is not subject to state or local taxation. (1.4). In using lands of state, the federal government may not disregard or limit the laws of the state; therefore, the Corps would be required to observe state prohibitions on dumping of dredge spoil.

The land may be acquired by the federal government in any way, including condemnation. (1.4). When the condemnation procedure is used, it must be instituted by the Executive Council on behalf of the federal government. (471.2). The state will then obtain the land; and convey all interests therein to the federal government.

ILLINOIS

The state of Illinois imposes minimal constraints on dredge spoil placement. The Illinois Department of Transportation is the agency which issues dredging permits and collects royalty fees for materials removed from river bottoms. A permit must also be obtained from the Illinois Environmental Protection Agency for pollutant discharges.

Although Illinois has not adopted an official policy concerning Corps dredging, it has tentatively indicated a willingness to allow all Corps dredging operations to be handled under the terms of one general permit.

Jurisdiction over Water and Adjacent Lands

Under Illinois law, riparians, or the owners of land adjacent to a stream, own the beds of navigable and non-navigable rivers. Their ownership rights are subject only to a public easement for navigation. The riparian would seem to include the right to dredge for the improvement of navigation. There apparently is not even a need to compensate the riparian bedowner for interference with his rights as long as only land below the ordinary high water mark is disturbed.

Although the case-law scheme of ownership is different in Illinois than it is in other states where the state holds the river bottom in public trust, the effect of the easement of navigation on riparian rights is such as to convert the Illinois scheme into public ownership of beds insofar as navigation is concerned.

Direct Constraints on Dredging

The DOT requires all dredgers to obtain a permit before commencing any work in public waters. (19 § 65). When sand and gravel is obtained from the river, a royalty is charged. (19 § 65a).

The DOT has issued criteria for dredging permits. Generally, the DOT evaluates applications in light of the need for the work, alternative locations and methods, and cumulative impacts. Several specific factors area also considered in dredging permit issuance. No dredging is allowed with 200 feet of a shoreline or dam. Spoil may not be discharged to the river in such a way that bars and ridges are formed in the bed. The dredging procedure used must minimize increases in suspended solids and turbidity. If the dredging will be performed close to a water supply intake, the owners of the intake must be given notice of the potential for changes in water quality.

When a dredger takes sand or gravel from the stream bed, the DOT charges a royalty based on the quantity of materials removed. (19 § 65a). The fee is based on the fair market value of the material. The DOT is allowed to waive the fee when the dredger is a government entity "...who is furnishing the material for use in a public project or construction work, and is not acting for or on the behalf of any [one] ...who is required to funish the material." (19 § 65a).

Jurisdiction over Waters Susceptible to Flooding

The DOT has the responsibility of preventing the carrying capacity of public waters from impairment by obstructions.

(19 § 70). This duty includes the power to control the placement of materials such as dredge spoil from placement on the stream bank in such a location that it might be susceptible to being washed into the stream by flood waters. The DOT is empowered to issue regulations to carry out this authority; it also exercises considerable control over placement of any object on a flood plain. (See infra under flood plain zoning). Its regulations may be enforced by injunction.

Water Quality Constraints

The state of Illinois also regulates the disposal of dredged spoil under its water pollution laws. The discharge of a pollutant is forbidden without a permit from the Illinois Environmental Protection Agency. (11½ § 1012f). Even if dredge spoil is not discharged into the water, it may not be placed in a manner that will cause a water pollution hazard. (111½ § 1012d).

Corps activities must also comply with water quality standards. Generally, the waters of Illinois must be free from unnatural sludge, bottom deposits, color, and turbidity. (WPC 203a). There are no specific standards for turbidity, but total dissolved solids must be maintained at a maximum of 1,000 mg/l in general use waters and no more than 500 mg/l in waters classified for use as public and food processing water supply.

Recently the Illinois EPA has recommended open water and shoreline disposal for dredged material as long as pollutant levels aren't significantly higher than those normally found in Mississippi River water.

MISSOURI

The state of Missouri places minimal constraints on dredging. Only one state permit is required and no royalty is charged. Controls that exist are more localized than in other states. Although the statutes of Missouri do not appear to indicate major constraints on the Corps, in conversations with state officials, the author has detected that statutes will be strictly applied. The attitude appears to be one of not allowing other states or federal agencies to encroach on the perogatives of Missouri.

Jurisdiction Over Waters and Adjacent Lands

Title to the bed of navigable streams in Missouri rests in the state. The definition of navigable used in the context of determination of bed ownership is, under state law, a fairly narrow test of capability of use in commerce. [Slovensky v. O'Reilly, 233 SW 478, 481-482 (Mo. 1921)]. Only large watercourses, such as the Mississippi, have been held navigable under this definition. In navigable waters of this type, the riparian owner owns to the low water mark. [Conran v. Girwin 341 SW 2d 75 (Mo. 1960)].

On navigable waters, the state has granted the counties title to the beds and to the islands in trust for school purposes. (241.290; 241.300).

Direct Constraints on Dredging

Missouri has no dredging permit system, and the Water Resources Committee of the Missouri DNR has recommended not to undertake a permit program even if federal funds are made available.

When sand and gravel are removed directly from the ground, the state requires the operator to obtain a non-coal surface mining permit. The term operator is defined as a "person, firm or corporation." (444.770). It is fairly clear that the Corps does not need to get a permit of this sort, since the Attorney General has ruled that counties and cities operating mines are not operators under the terms of the statute. (Opin. Att'y Gen., no. 213, Sept. 22, 1972).

Water Quality Constraints

The only necessary state dredging permit is a requirement of the Missouri Clean Water Commission (CWC). The commission's regulations specifically include dredged spoil within the definition of pollutant. [10 CSR 20-6.010 (26)].

All persons are required to obtain permits for the operation of a water contaminant source. [10 CSR 20-6.010 (5)]. Water contaminant is defined as "any particulate matter or solid matter which is in or enters any waters of the state..." Federal dischargers are required to obtain such permits, since the statute includes the federal government within its definition of person.

Dredging operations are clearly within the scope of those activities for which a permit is needed. The regulations specifically state that all operations covered by one Corps dredging permit are considered to be one operating location for the purposes of obtaining an operating permit from the CWC. [10 CSR 20-6.010 (5)B]. A permit is not required, however, for the removal of sand and gravel from stream beds if the minerals are to be sold.

Acquisition of Land by the Federal Government

When acquiring property in Missouri, the Corps will have to deal with both the state and its counties. The state has statutorily granted title to all overflowed and swamp land to the counties. (241.0101). Control and power to sell off these lands is vested in the county court. (241.150). Such lands must be sold at public or private sale for at least $1.25 an acre. (241.160).

The state has also granted all islands and abandoned riverbeds to the counties for use for school purposes. (241.290). Both islands and riverbeds that have been formed and those that may form in the future have been granted to the counties. (241.300). This grant also includes a grant to gravel and sand deposits occurring in the river beds and islands. (Opin. Att'y Gen. No. 84, Oct. 22, 1954). However, a 1971 amendment to this statute now grants title to all newly-formed islands and abandoned riverbeds first to the Missouri Conservation Department for wildlife purposes, then to the county for recreational purposes, and lastly to the county for sale if no higher use can be found. (241.291).

6. Public Concerns

The public has expressed interest in the location of dredge material disposal sites and productive uses of material that will result from proper placement of sites. Historic requests vary from creating beaches to building levees, and all recent requests are outlined in an earlier section of this report (1979 conditions - Existing Demand for Dredged Material). The problem identification

section of this report outlines further requests for material made by the public at GREAT II Public Meetings.

C. Projected Conditions - 2025 (Without GREAT)

1. Projected Needs for Material

As population increases so does construction activity which directly increases demand on existing resources. Few demands on existing resources would include dredged material because it would not be considered a valuable or extensive resource. The availability of dredged material would not be known by the majority of the public-private sector that could use it.

2. Projected Relationship of Dredged Material to Industry and Areas's Economy

Since dredged material's value and availability as a resource would not be known there would be no change between base conditions and projected conditions.

3. Projected Disposal Sites of Material

The most probable change of disposal site location between base conditions and projected conditions (without action) would be caused by the development of a new dredge cut in an area where there are no existing sites within reach of existing equipment. Another possible change is disposal sites could result from the capacity of an existing site being exceeded, necessitating the selection of a new site.

The section of this report dealing with federal and state regulations on dredge material disposal points out the fact that there are radically different approaches to disposal between the states.

It is possible that without any action by GREAT more uniform legislation may develop among the states. Any change in present day policies will affect the types of sites where dredged material can be placed.

4. Projected Uses of Material

If shortages of sand in existing markets develop in the future, exploration for the resource will expand. If that happens dredged material may be "discovered" and be occasionally used for sanding roads, construction fill, and possibly as an aggregate in concrete. If shortages do not develop the value and availability of dredged material as a resource would not be known. The projected uses (without action) would probably not change from base conditions.

5. Trends

Without any further action dredged material would be regarded as a rather worthless inaccessible resource, with demand for it being about the same as outlined in 1979 Base Conditions. Dredging equipment would probably remain the same, resulting in limitations as to where material can be placed. Historic sites would probably be used extensively. Demand and uses for the sand would change only if shortages for the material developed in existing markets. Even then, studies similar to those done by the DMUWG would have to be initiated.

6. Public Concerns

Demand for beaches and recreational areas on or near levees will probably increase. As existing disposal sites expand, environmental groups will probably become increasingly concerned about degradation of nearby backwaters and wetlands. Other future concerns will probably remain unchanged from present ones.

III. WORK GROUP ACTIVITIES/ACCOMPLISHMENTS

A. Market Study

1. Introduction

In the past, demand for dredged material has in large part been determined by random requests received by the Corps of Engineers. Most requests were from private citizens and only for very small quantities of material. As a result very few requests have been satisfied. Due to increasing transportation costs and in some cases a scarcity of material it has become increasingly important for both public and private sectors along the river to find construction aggregate and fill as close as possible to their use area.

2. Purpose and Scope

Channel maintenance activities in the Rock Island District on the Mississippi River over the last five years (1974-1979) have resulted in an average of 378,000 cubic yards of sand a year being dredged and deposited along the banks, on islands, or back into the river. It is the purpose of the market study to make potential users of sand along the river corridor aware of the possible availability of the dredged sand, determine their demand for it, and recommend equipment types and disposal sites that will make it possible to have the sand available for their use.

All city, county, and state officials along the river corridor study area were contacted both by phone and by mailing them detailed information packets (IGS office). Included in the packets was information on sediment sample locations and sieve analyses, a paper by Lee, Chung, and Case on "Waste Dreged Material in Construction",

a copy of a memo addressing Corps policy in disposing of dredged material, maps of potential disposal sites in the users area, and a questionnaire that was designed to determine demand for sand over a 50 year planning time frame, value of similar grades of sand to the user, use to which the sand will be put, and transport capabilities of the user.

A similar packet was sent to all sand and gravel producers and redi-mix dealers to determine the extent of their existing market and whether they would be able to use dredged material to expand or supplement their market. If so, attempts were made to determine to what uses the material would be put and what values a similar material would have in the existing market. Company names and extent of market information can not be released but demand and estimated value of sand estimates were used in determining pool values for demand and dredged sand value.

3. Data Analysis

a. Demand Requests

In February, 1979, 150 questionnaires were mailed to city, county, and state officials and to all sand and gravel and redi-mix dealers along the river corridor in the GREAT II study area. As of August, 1980, 80 responses were received. All persons not responding were contacted by phone to ensure that all questionnaires were received and answer any possible questions there may be about the study. Those not replying either had no demand for the material or an established supply with no need for further sand.

Sand demands were generally localized and could have their demands correlated to a specific pool. Sand and gravel producer demands were assigned to the pools where their pits and processing equipment are located. If a producer had pits in more than one pool and could supply the work group with just an overall demand to cover the whole river, we apportioned the demand among all their existing pits. With further coordination areas that aren't existing pits will be selected where material could be made available to producers. City demands were usually located in just one pool. County demands were somewhat more difficult to apportion as in most cases counties border more than one pool. County demand was apportioned to various pools based upon the percentage of the county river bank that was located in each of the pools. Demand estimates were derived for the short term (5 years) and the long term (50 years).

b. Value of sand

Included in the questionnaires were questions relating to the price of sand. Sand and gravel producers were asked to supply the average pit price (includes loading and equipment costs at the pit) of all their sand that is sold, and city, county, and state representatives that responded to the survey supplied information on their average purchase price of sand. Due to the possible multiuses of dredged sand just average sand values were requested. Attempts were made to determine to what uses the dredged material would be put, but very few

respondents were able to supply that type of information for the 50 year plan. Based upon the GREAT II DMUWG contract report "Waste Dredged Material for Construction" by Pyung-Hi Chung (IGS office), it was assumed that the dredged sand could be used for many purposes, including portland cement concrete aggregate, asphaltic concrete aggregate, mortar sand, fill, sanding roads, levee construction, and beach nourishment.

The U.S. Bureau of Mines has calculated average values of sand for most counties bordering the Mississippi River in the GREAT II study area. Their values were determined by contacting all sand and gravel producers, determining uses of all their sand that is sold, and quantities and prices of sand for each use. From this an average value of sand in each county was determined.

A weighted average value of sand was determined for each county from information received on the returned questionnaires. For each county in the study area dredged sand demand estimates were totalled and the percentage each request contributed to the total was determined. The percentage figure was then multiplied by the value of sand to the specific entity to determine their contribution to the total average value of sand in the county, which was computed by adding all the specific entities contributing figures together. This approach differs from that of the Bureau of Mines in that values of sand to users and not only sellers of sand are taken into consideration.

Average values of sand for each of the pools was determined in a manner similar to that used to allocate county demands to various pools. At least two, and in most cases three or four counties are located within each pool. For each pool an estimate of the total river miles of bank (both left and right) was determined. The river miles of bank in each pool for each county was also estimated. From these figures a percent of a pool bordered by a specific county was determined. The percent figures for each county were multiplied by their average values of sand and the results added to give a weighted average of values of sand for each pool.

4. Results & Discussion

a. Demand for Material

A chart on dredged material demand - utilization is presented in Figure 1. In this chart a comparison is made on a pool by pool basis between the amount of material estimated to be dredged and the amount of material requested. An assumption is made that all the material dredged could potentially be made available to satisfy a demand, and this is reflected in the % demand that could be satisfied column. Another column, % dredged material utilized, represents the % of material dredged that would be utilized to achieve the % of demand that is being satisfied.

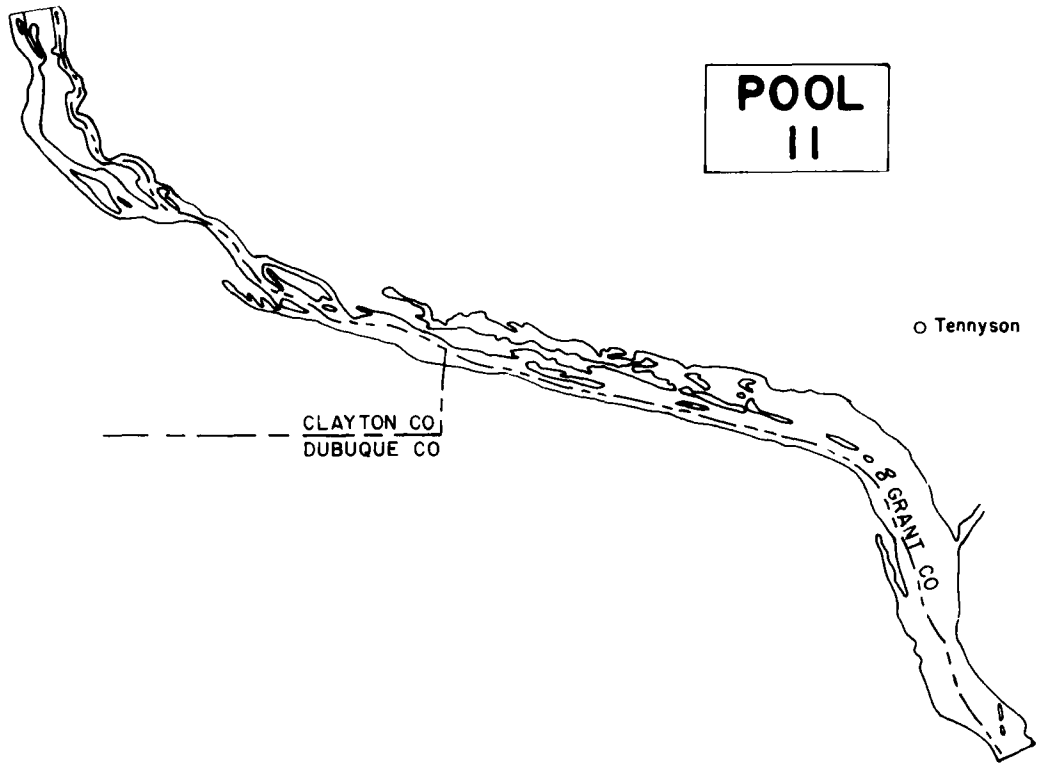
The demand estimates for both five and fifty years are presented in the following pages (Fig. 2-12). The figures shown represent demand for material that was discovered through the market study.

Dredged Material Demand - Utliization

Pool	50 Year Dredging Predictions Cu. Yds.	50 Year Demand Estimates Cu. Yds.	% Demand that could be Satisfied (100% Max)	% Dredged Material Utilized (100% Max)
11	1,175,000	2,538,275	46%	100%
12	125,000	2,065,060	6%	100%
13	1,830,000	2,001,000	91%	100%
14	1,596,250	3,428,400	47%	100%
15	80,000	962,650	8%	100%
16	956,250	1,201,150	80%	100%
17	605,000	1,263,725	48%	100%
18	1,566,250	1,580,865	99%	100%
19	1,517,500	1,657,805	92%	100%
20	2,244,500	2,581,500	87%	100%
21	1,375,000	1,575,000	87%	100%
22	1,596,250	1,644,210	97%	100%
Total	14,667,000	22,504,640	65%	100%

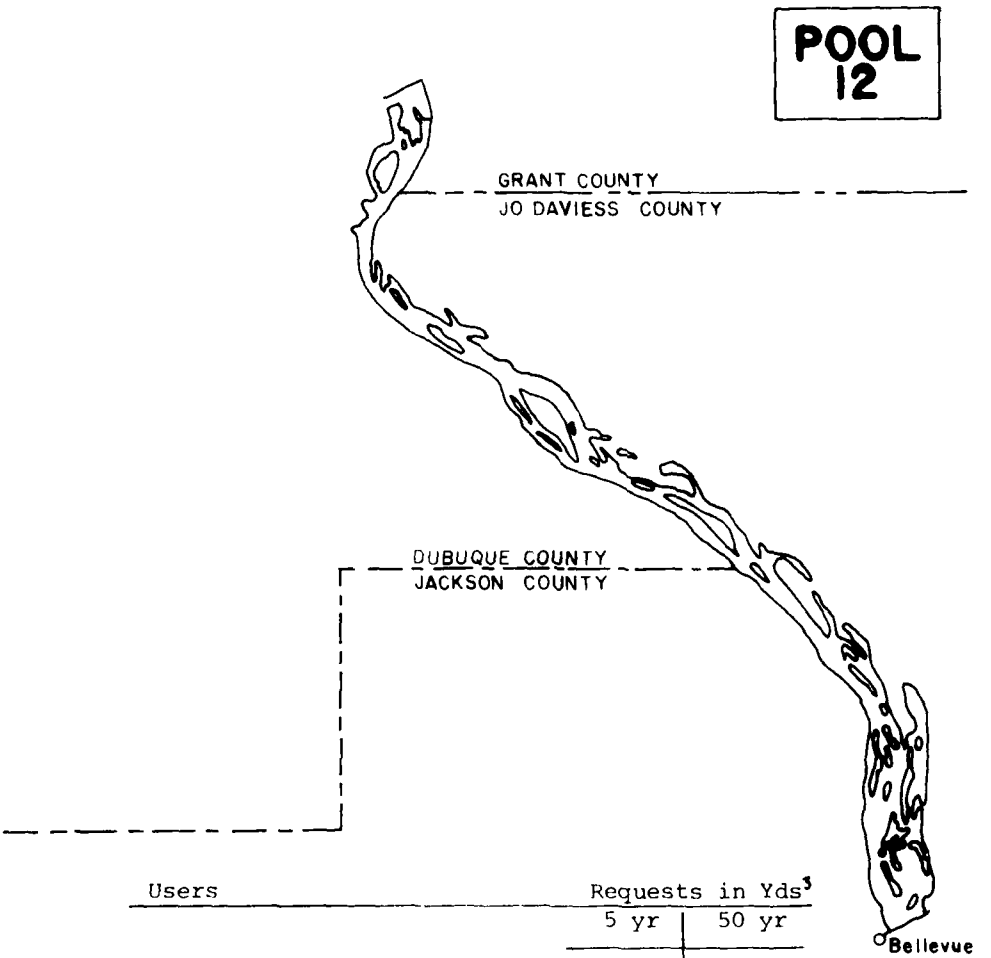
Assume material dredged and placed within pools. Figures change when assume barging capabilities.

Figure 1.



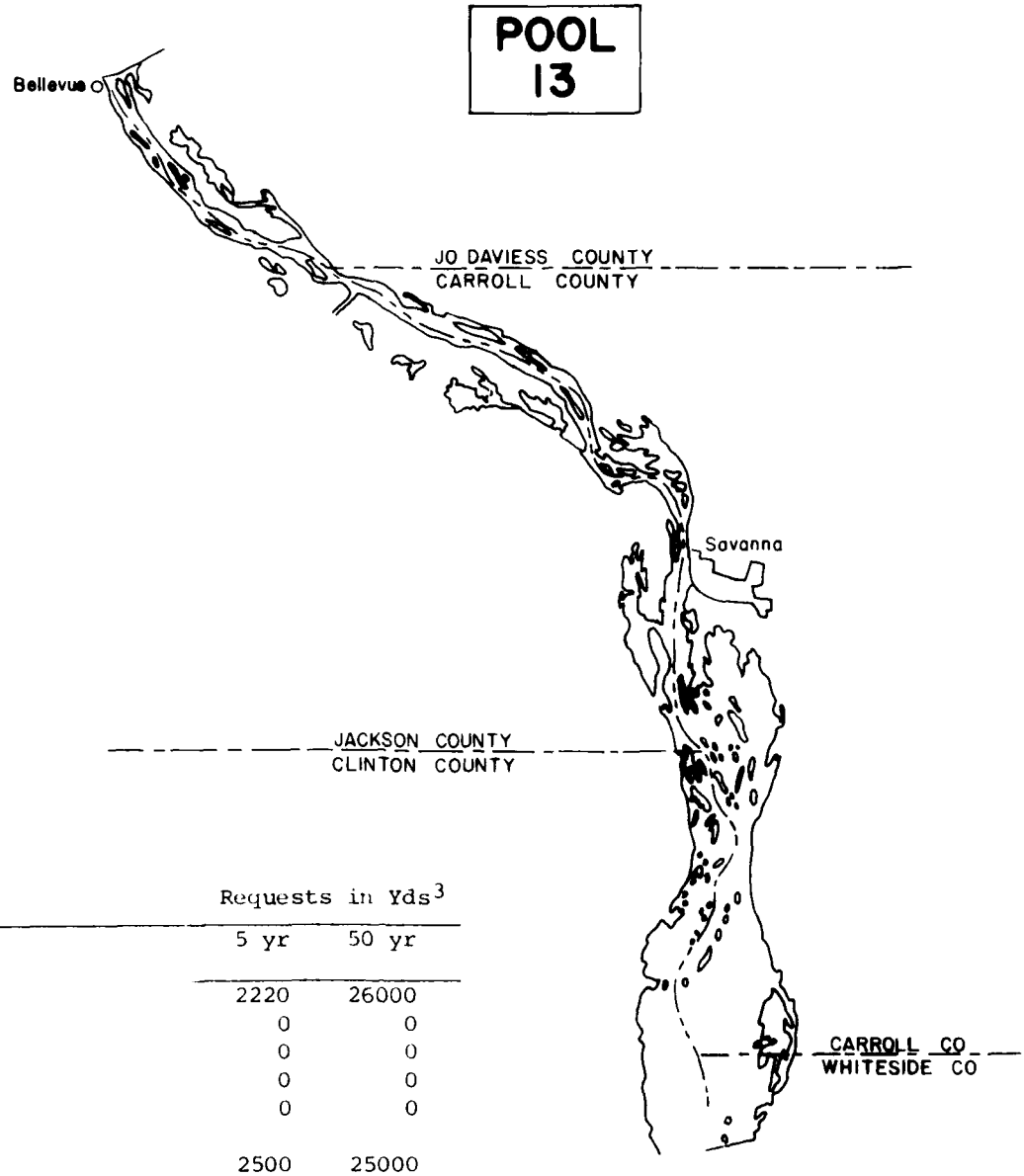
Users	Requests in Yds^3	
	5 yr	50 yr
Grant Co.	1332	13320
Dubuque Co.	1750	21250
Clayton Co.	0	0
Tennyson	518	3705
Sand & Gravel Cos.	250000	2500000
Total Requests	253600	2538275

Fig.2



Users	Requests in Yds^3	
	5 yr	50 yr
Grant Co.	148	1480
Dubuque Co.	1750	21250
Jackson Co.	1480	17330
Jo Daviess Co.	0	0
Belleview	2500	25000
Sand & Gravel Cos.	200000	2000000
Total Requests	206026	2065060

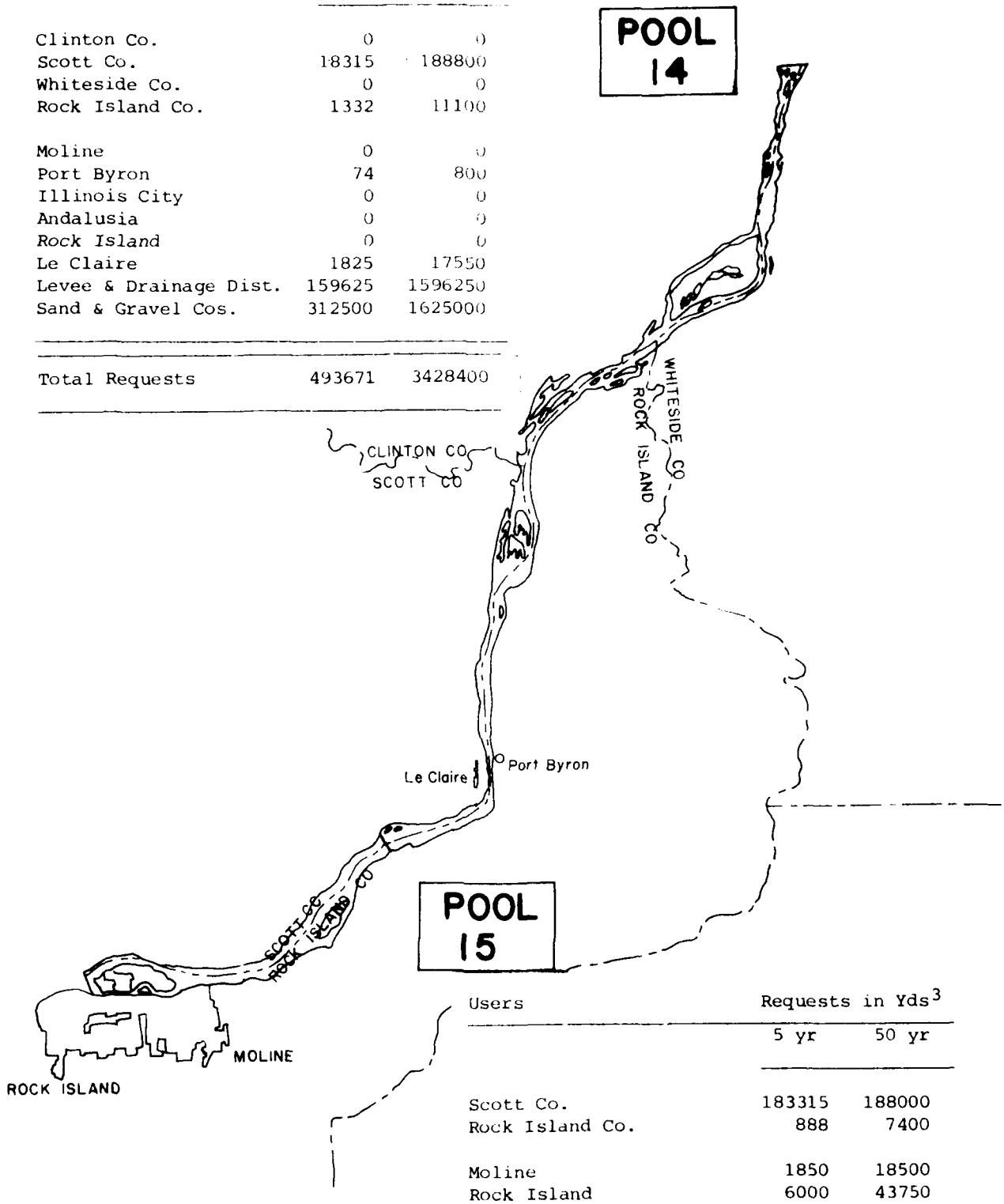
Fig.3



Users	Requests in Yds^3	
	5 yr	50 yr
Jackson Co.	2220	26000
Jo Daviess Co.	0	0
Clinton Co.	0	0
Carroll Co.	0	0
Whiteside Co.	0	0
Belleview	2500	25000
Savanna	2000	20000
Levee & Drainage Districts	183000	1830000
Sand & Gravel Cos.	10000	100000
Total Requests	197720	2001000

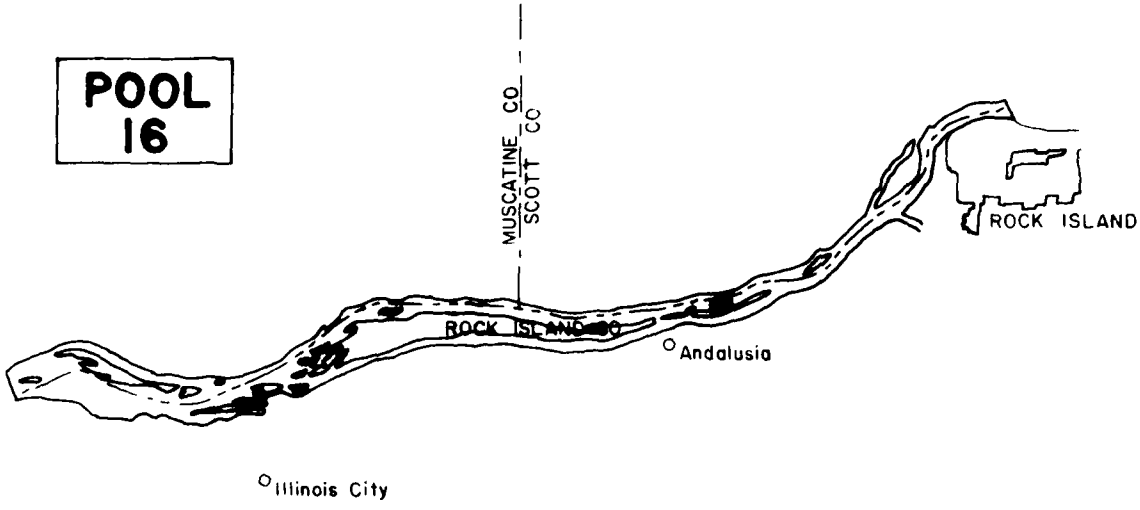
Fig.4

Users	Requests in Yds^3	
	5 yr	50 yr
Clinton Co.	0	0
Scott Co.	18315	188800
Whiteside Co.	0	0
Rock Island Co.	1332	11100
Moline	0	0
Port Byron	74	800
Illinois City	0	0
Andalusia	0	0
Rock Island	0	0
Le Claire	1825	17550
Levee & Drainage Dist.	159625	1596250
Sand & Gravel Cos.	312500	1625000
Total Requests	493671	3428400



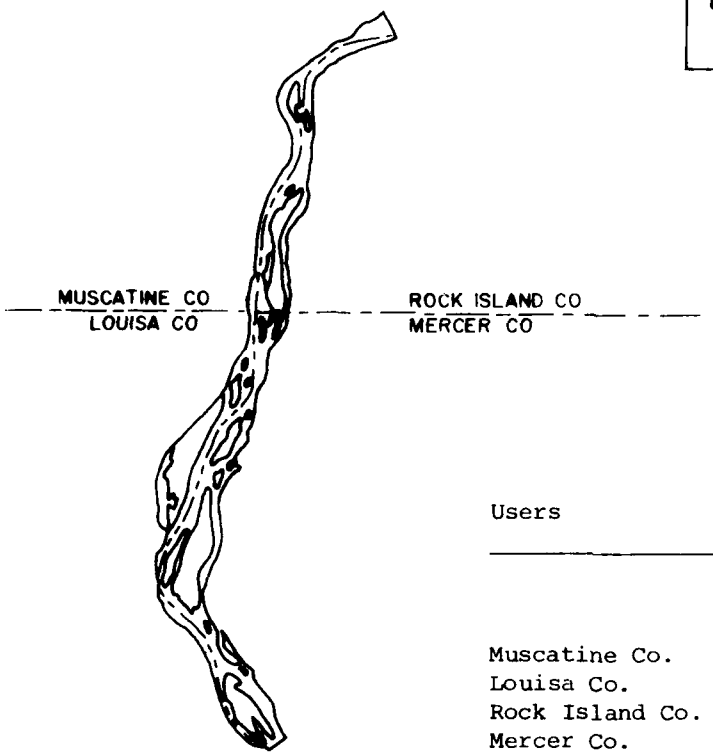
Users	Requests in Yds^3	
	5 yr	50 yr
Scott Co.	183315	188000
Rock Island Co.	888	7400
Moline	1850	18500
Rock Island	6000	43750
Levee & Drainage Districts	8000	80000
Sand & Gravel Cos.	75000	625000
Total Requests	110053	962650

Fig.5



Users	Requests in Yds^3	
	5 yr	50 yr
Scott Co.	18315	188800
Rock Island Co.	1776	14800
Muscatine Co.	4500	38100
Illinois City	55500	40700
Andalusia	25000	250000
Rock Island	4000	43750
Sand & Gravel Cos.	150000	625000
Total Requests	259091	1201150

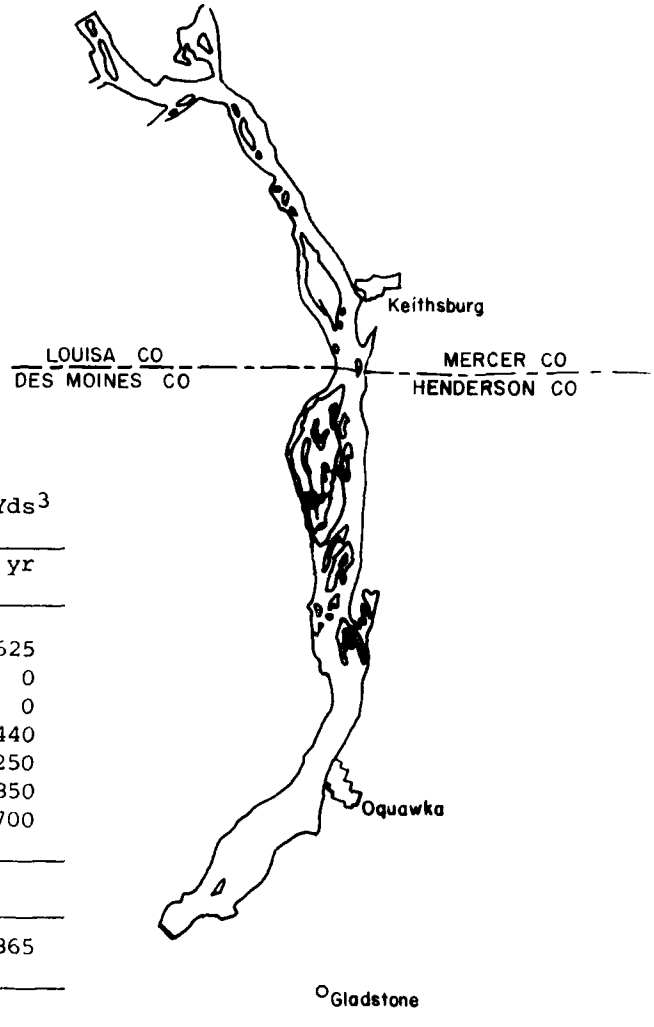
Fig.6



Users	Requests in Yds^3	
	5 yr	50 yr
Muscatine Co.	4500	25400
Louisa Co.	1110	4625
Rock Island Co.	444	37000
Mercer Co.	0	0
Levee & Drainage Dist.	60500	605000
Sand & Gravel Cos.	75000	625000
Total Requests	141554	1263725

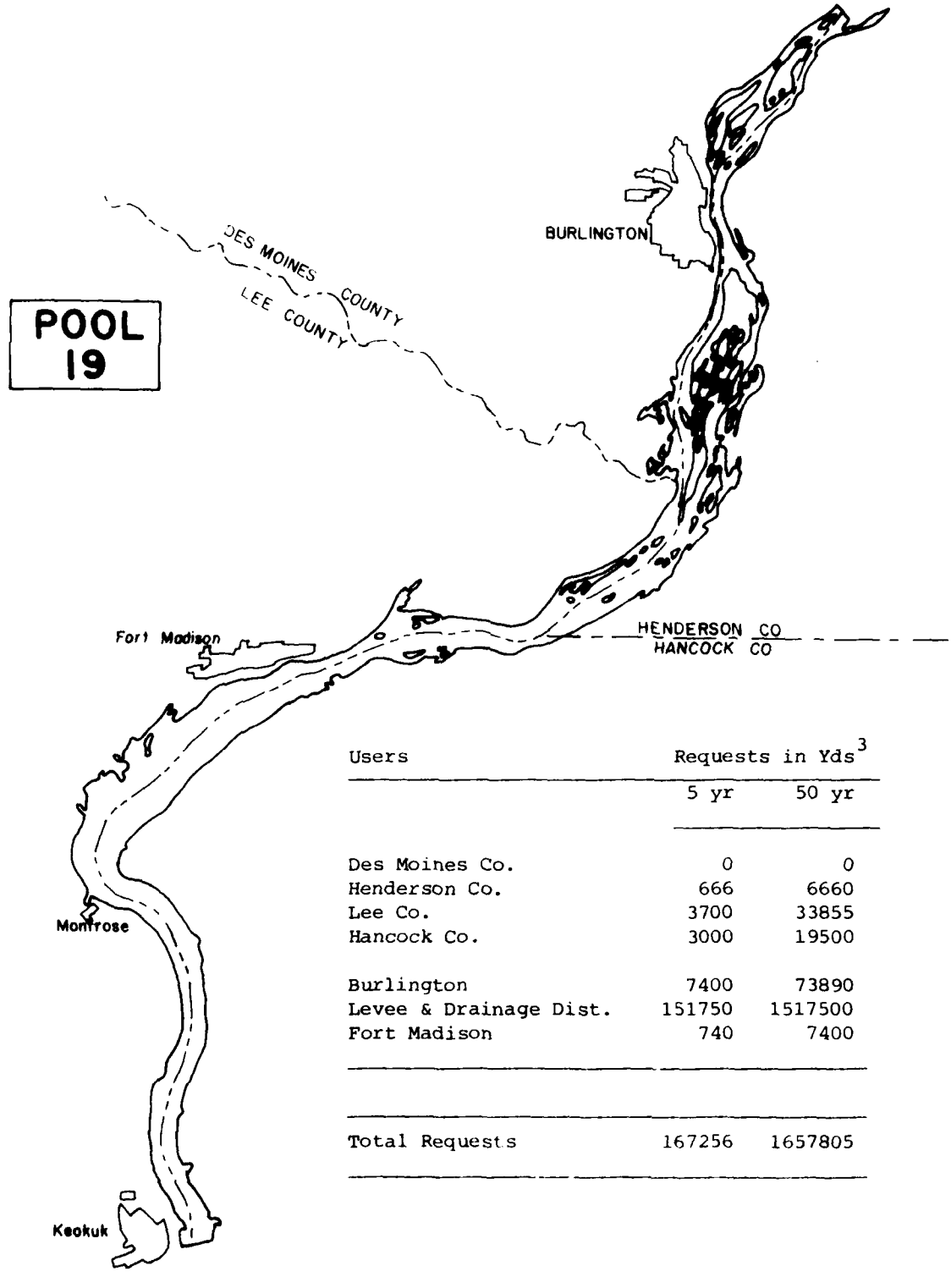
Fig.7

POOL 18



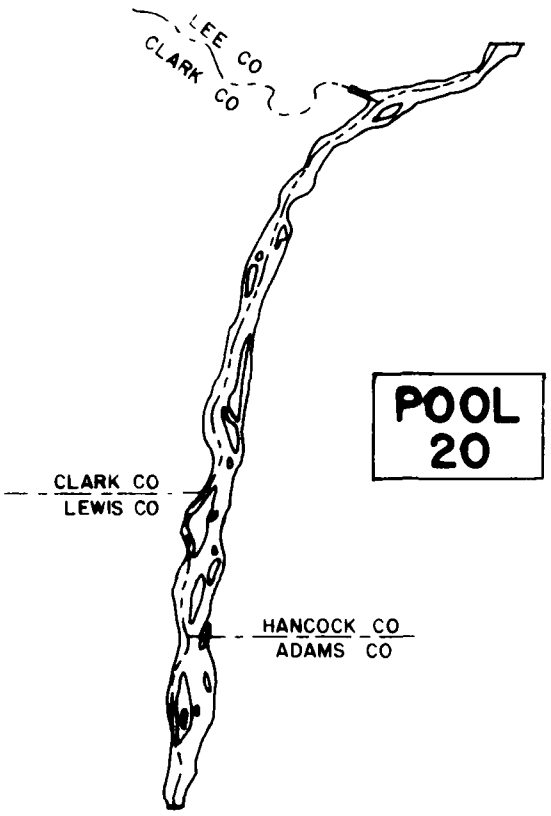
Users	Requests in Yds^3	
	5 yr	50 yr
Louisa Co.	1110	4625
Des Moines Co.	0	0
Mercer Co.	0	0
Henderson Co.	444	4440
Levee & Drainage Dist.	156625	1566250
Glandstone	185	1850
Oquawka	370	3700
Total Requests	185734	1580865

Fig.8



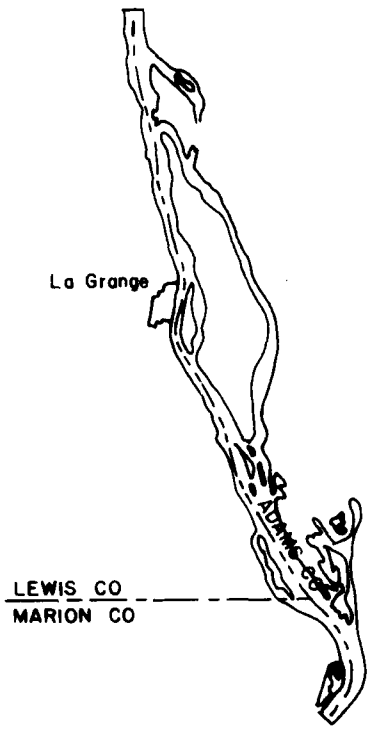
Users	Requests in Yds^3	
	5 yr	50 yr
Des Moines Co.	0	0
Henderson Co.	666	6660
Lee Co.	3700	33855
Hancock Co.	3000	19500
Burlington	7400	73890
Levee & Drainage Dist.	151750	1517500
Fort Madison	740	7400
Total Requests	167256	1657805

Fig.9



Users	Requests in Yds	
	5 yr	50 yr
Clark Co.	0	0
Lewis Co.	0	0
Hancock Co.	3000	19500
Adams Co.	0	0
Keokuk Co.	5500	317000
Levee & Drainge Districts	224450	2244500
Total Requests	232950	2581000

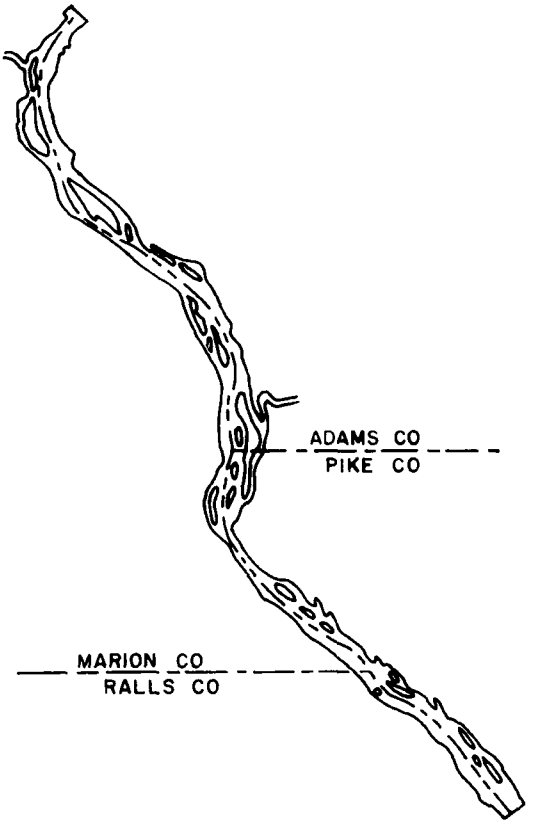
Fig.10



POOL 21

Users	Requests in Yds^3	
	5 yr	50 yr
Lewis Co.	0	0
Marion Co.	0	0
Adams Co.	0	0
La Grange	200000	200000
Levee & Drainage Dist.	137500	1375000
Total Requests	337500	1575000

Fig.11



Users	Requests in Yds^3	
	5 yr	50 yr
Marion Co.	0	0
Ralls Co.	0	0
Adams Co.	0	0
Pike Co.	740	2960
Levee & Drainage Dist.	159625	1596250
Sand & Gravel Cos.	5000	50000
Total Requests	165365	1649210

Fig.12

The DMUWG has found, through contact with the Upper Mississippi Flood Control Association, that the levee and drainage districts bordering the Mississippi River within the GREAT II area would use dredged material for levee maintenance and construction if placed nearby. Most of these productive uses would take place in the lower pools (17-22). Dredged material could be stockpiled in flood plain sites near the levees and rehandled hydraulically with a greater amount of control than is present under normal channel maintenance procedures. If there was congressional authorization for the Corps or separate funding from the levee districts for raising the heights of the levees all the material dredged in the leveed pools could be utilized for this purpose with minimal environmental or economic impacts. A listing by pool of levee and drainage districts that border the GREAT II area of the Mississippi River follows.

Pool 11	None
Pool 12	None
Pool 13	Green Island Levee & Drainage Dist. No. 1 Jackson Co., Ia.
	Carroll Co. Drainage & Levee Dist. No. 1 Carroll Co., Ill.
	Clinton Co. Drainage Dist. No. 16 Clinton Co., Ia.
Pool 14	Meredosia Levee & Drainage District Whiteside & Rock Island Co., Ill.
	Carroll District (Princeton Wildlife Area) Scott Co., Ia.
Pool 15	Campbells Island Drainage & Levee Dist. Rock Island Co., Ill.
Pool 16	None
Pool 17	Muscatine Island Levee District Muscatine and Louisa Co., Ia.

	Drury Drainage District Rock Island Co., Ill.
	Sub-District No. 1 of Drainage Union No. 1 Rock Island & Mercer Co., Ill.
Pools 17 & 18	
	Bay Island Drainage & Levee District No. 1 Mercer Co., Ill.
	Muscatine-Louisa Co. Levee Dist. No. 13 (Lake Odessa) Muscatine & Louisa Co., Ia.
Pool 18	Keithsburg Drainage District Mercer Co., Ill.
	Henderson Co. Drainage District No. 3 Henderson Co., Ill.
Pools 18 & 19	
	Iowa River Flint Creek Levee Dist. No. 16 Louisa & Des Moines, Co, Ia.
	Henderson Co. Drainage District No. 1 Henderson, Co., Ill.
Pool 19	Henderson Co., Drainage District No. 2 Henderson Co., Ill.
	Green Bay Levee & Drainage District No. 2 Lee Co., Ia.
Pool 20	Des Moines and Mississippi Levee District No. 1 Clark Co., Ia.
	Mississippi & Fox River Drainage District No. 2 Clark Co., Mo.
	Gregory Drainage District Lewis & Clark Co., Mo.
	Hunt Drainage District Hancock Co., Ill.
Pools 20 & 21	
	Lima Lake Drainage District Adams Co., Ill.
Pool 21	Indian Grave Drainage District Adams Co., Ill.
	Union Township Drainage District Lewis Co., Mo.
	Fabius River Drainage District Lewis & Marion Co., Mo.

Pools 21 & 22
South Quincy Drainage District
Adams Co., Ill.

Pool 22 Marion Co. Drainage District
Marion Co., Mo.

South River Drainage District
Marion Co., Mo.

Sny Island Levee & Drainage District
Adams & Pike Co., Ill.

b. Value of Sand

A comparison of the Bureau of Mines and GREAT II market study figures on average value of sand by counties is presented in Figure 13. All dollar values represent dollars per cubic yard of sand. In some cases insufficient data was supplied on the returned questionnaires, and GREAT II values were taken from the Bureau of Mines data. This is true in Iowa for Clayton County, in Illinois for Jo Daviess, Whiteside, and Adams Counties, and in Missouri for Clark and Marion Counties.

The average value of sand by pools is shown in Figure 14. A comparision is made between left descending bank (LDB) and right descending bank (RDB) values also. It is noted that above pool 16 the RDB values are generally higher than LDB values, and below pool 15 the LDB values are higher than RDB values. The data was collected in late 1978 - early 1979, and the dollar values represent 1978 values. The Bureau of Mines data was collected in 1977-78 and released in 1978.

c. Discussion

As a result of the market study and greater public awareness of the potential availability of dredged material, demand for it

Average Value of Sand by Counties (1978 dollars)

Comparison of GREAT and Bureau of Mines Values

State	County	GREAT Market Study ($/cu. yd.)	Bureau of Mines ($/cu. yd.)
Wisconsin	Grant	$2.37	$2.39
Iowa	Clayton	2.39	2.39
	Dubuque	4.30	4.77
	Jackson	2.51	2.92
	Clinton	2.43	2.38
	Scott	3.32	3.33
	Muscatine	2.11	2.27
	Louisa	.95	----
	Des Moines	2.14	2.12
	Lee	2.05	2.04
Illinois	Jo Daviess	3.24	3.24
	Carrol	3.22	----
	Whiteside	3.20	3.20
	Rock Island	2.81	3.10
	Mercer	2.52	----
	Henderson	2.22	----
	Hancock	2.36	----
	Adams	3.00	3.00
	Pike	2.78	2.70
Missouri	Clark	2.21	2.21
	Lewis	2.35	3.12
	Marion	1.35	1.35

Figure 13

Average Value of Sand by Pools (1978 dollars)

(Overall and by State)

Pool	Average Pool Value ($/cu. yd.)	Average RDB Value ($/cu. yd.)	Average LDB Value ($/cu. yd.)
11	$3.00	Iowa - 3.64	Wisc. - 2.37
12	$3.33	Iowa - 3.50	Ill. - 3.16
13	$2.86	Iowa - 2.49	Ill. - 3.22
14	$2.96	Iowa - 2.96	Ill. - 2.97
15	$3.07	Iowa - 3.32	Ill. - 2.81
16	$2.77	Iowa - 2.72	Ill. - 2.81
17	$2.03	Iowa - 1.42	Ill. - 2.63
18	$2.00	Iowa - 1.66	Ill. - 2.33
19	$2.19	Iowa - 2.08	Ill. - 2.30
20	$2.35	Mo. - 2.24	Ill. - 2.46
21	$2.77	Mo. - 2.54	Ill. - 3.00
22	$2.12	Mo. - 1.35	Ill. - 2.89

Figure 14

has increased markedly. If made available, the dredged material would be fully utilized in all pools. Not all the material dredged can be made available in an economical or environmentally sound manner though. For example dredged material is readily placed in front of levees but in many cases valuable habitat would be destroyed. If the material is placed behind the levees with present hydraulic equipment there is a problem with returning the dredging water to the river. The levee districts, although they have great demand for the material, can not afford to pump all the water back without financial assistance. It may be necessary to construct dikes against the levees to contain the water and sand and install temporary pumps in the diked area to return the water. The problem could be minimized with mechnical equipment. The best solution to the levee problem may be to rehandle the material for selective placement in building up the levee height, as discussed on page 74.

Recommendation 4504 (p. 154) details the dredged material requests, the miles the potential user is willing to travel to pick up the material, and the site that if disposed on would assure that the material could and would be utilized. Not all of the disposal sites have been accepted by GREAT II and as a result not all the demand can be met as is shown in Table 1. In the future new sites may be selected that will be located such that all demand can be met. Also, as discussed earlier some of the material may be rehandled in order to satisfy some of the demand.

Current equipment limitations of the Corps of Engineers prohibit all of the demand from being satisfied in the short term (5 years). The dredge Thompson has limited hydraulic transport capability -

Beneficial Use Requests That Could Be Met per Each Transport Distance Category

Pool	Total Requests	0-1 mile	0-2 mile	0-3 mile	Greater than 3
11	12	5	5	8	2
12	8			1	2
13	16	9	9	10	3
14	19	11	13	17	3
15	7	2	2	2	1
16	11	6	6	8	2
17	12	3	3	3	1
18	20	8	12	12	4
19	20	12	16	19	2
20	10	5	8	8	1
21	7	10	9	9	1
22	10	4	8	8	1
Total	152	75	91	105	23

Table 1

mile transport capability to be reasonable and technologically feasible. As can be seen on Table 1, with that capability, at least 96% of the demand for material can be satisfied. With the addition of barging capability, at least 84% of the demand can be satisfied over the 50 year planning time frame. Specific disposal sites have not been selected for all the levee stockpiles as of yet. With those sites are incorporated the percentage estimates will be much higher.

The overall average value of sand in the study area is $2.62/ cubic yard. Not all sand dredged by the Corps will have that value as particle size distributions do vary throughout the river as discussed in the analysis of dredged material section of the Appendix. The average values may help in determining where material should be placed in the future though.

5. Conclusions

In summary it can be seen that the market study has uncovered a great demand for dredged material. On pages 16 through 25 are historic demand figures, but only two of the requests were satisfied and only small yardages have been involved. The study has shown that if equipment is made available to reach selected disposal sites, nearly all the material dredged would be utilized. It is not entirely economically or environmentally justifiable to try to reach all the disposal sites yet, but as the value of sand increases, peoples willingness to cost share the transport of the

dredged material develops, and all the environmental impacts of historic disposal can be shown, it will be more feasible.

B. Aggregate Study - Analysis of Dredged Material Constituents and Properties

1. Introduction

Dredged material has historically been used for beach creation and maintenance, sanding roads, and occasionally for repairing breaks in levees. As a result of these uses there has not been a great demand for the material, and due to the application of the material to these uses many people have assumed that those are the only possible applications. As a result of these problems the Civil Engineering Department of Iowa State University completed a study entitled "Waste Dredged Material for Construction" by Pyung-Hi Chung. The study was under the Direction of Dr. Dah Yin Lee of Iowa State University, Jim Case of the Iowa Geological Survey, and the DMUWG of GREAT II, with funds being provided by GREAT. Most information provided below is excerpted from the study which is available in its entirety from the Iowa Geological Survey.

2. Purpose and Scope

The purpose of this study is to determine the suitability of dredged material as a fine aggregate for portland cement concrete, asphalt concrete for highway construction, and as a stabilized material for roadway bases and subbases. Since large quantities of aggregate are required for the construction purpose and high quality aggregate is becoming less available, demonstration of the dredged material for use as a construction material could lead to decreasing the effects of material shortage and to increasing the capacity of dredged disposal areas.

3. Methods of Investigation

Dredged material samples from 11 pools were collected from historical disposal sites in consecutive river pools (pools from 11 to 14 and 16 to 22) along the upper Mississippi River for this study. One to four samples were collected from different disposal sites at each pool. Dredged samples were collected by the personnel of the Iowa Geological Survey during March 1978. Field sample collection procedure for each site consisted of sectioning a sand pile in two or three locations to determine if there were significant lateral variations in sediment size. If there were significant lateral variations, it indicated that the disposal sites had been subjected to periodic flooding and, in that case, samples were collected below any disturbed zones that were present. All samples were collected from dredged sand that created beaches on either the riverbank or islands. This was one of the most operationally feasible ways to obtain a large number of samples in a short period of time. The locations of five representative samples are shown in Figure 15. Initially a total of 50 to 160 pounds of dredged material was obtained from each pool and delivered to the Engineering Research Institute at Iowa State University for this study. Additional samples from pools 14, 21, and 22 were collected from these same sites when they were selected for detailed study. Particle size distribution analyses were performed on all samples collected. According to the results of particle size distribution analyses, dredged material from five pools was selected for detailed engineering study. These five samples can be divided into three size groups as follows:

1) coarse-grained - Pools 21 and 22

2) medium grained - Pool 18

3) fine-grained - Pools 11 and 16

The investigation was then conducted in four phases:

1) physical and classification tests

2) the determination of the properties of portland cement concretes containing dredged materials as fine aggregates

3) the determination of mixture properties of asphalt concretes using dredged materials as fine aggregates

4) stabilization of dredged materials with lime and fly ash.

a. Material Properties

The following tests were performed on the representative samples of five dredged materials to determine the basic properties:

1) particle size analysis

2) specific gravity and absorption

3) petrographic analysis

4) loose void content and orifice flow test

5) X-ray diffraction analysis.

b. Organic Impurities

Certain types of organic matter may occur with natural aggregates. Among these, tannic acid and its compounds, derived from the decay of vegetable matter, can interfere chemically with the hardening and strength development of concrete. For the construction purposes, it is very important to examind the aggregates to see if they contain a significant amount of organic matter.

Figure 15. Dredged sample locations

DREDGED SAND SAMPLE LOCATIONS

Pool	Sack	River Mile	Miscellaneous
11	A	608.6	Island 189
	B	609.7	
	C	613.0	
	D	595.8	Findleys Landing
12	A	574.3	Ninemile Island
13	A	552.8	Bowman Island
	B	548.	Illinois Side Island
	C	544.4	Illinois Side Island
	D	533.1	Mound Island
14	A	503.7	Iowa Side Island
	B	509.	Iowa Side Island
	C	514.	Albany Beach
	D	494.	L & D 14
16	A	467.6	Andalusia Island
	B	473.	Island 319
	C	461.6	Iowa Side Island
17	A	453.2	
	B	448.	Bass Island
18	A	434.	Island 353
	B	425.5	Willow Bar Island
	C	420.3	Johnson Island
19	A	406.	Willow Bar
	B	402.2	Burlington Island
20	A	344.	
	B	349.	
	C	355.1	Fox Island
21	A	332	Hogback Island
	B		
	C	336.	LaGrange
22	A	316.	
	B	314.3	Whitney Island
	C	311.6	Ziegler Island
	D	320.2	

Table 2

The colorimetric testing method was used according to ASTM C40. If the color of sample is lighter than reference standard color, it is conclusive evidence of freedom from harmful organic matter. If the color of sample is darker than reference standard color, it may or may not indicate danger. For the two darkest colored samples, a mortar strength test for organic impurities was performed following ASTM C89.

c. Mortar Strength

One of the criteria in determining the suitability of a fine aggregate for portland cement concrete is the strength ratio of a mortar made with the fine aggregate to a mortar made with a standard graded Ottawa sand. Those two kinds of mortar cube specimens were made at a fixed sand-cement ratio of 2.75 according to ASTM C109. Type I portland cement was used in this test. Specimens were removed from the molds after 24 hours and immersed in a water bath for 6 days, after which compressive strength tests were performed.

d. Portland Cement Concrete

Strength of portland cement concrete is commonly considered as the most valuable property. The water-cement ratio is a major factor affecting the strength of hardened concrete. Compresive strength of the portland cement concrete specimen made with dredged sample was determined at varying water-cement ratios in order to obtain this relationship.

A total of 20 batches of portland cement concrete were made and Type I portland cement was used. Four batches of concrete were made from each dredge sample including three batches using

1-inch limestone and one batch using 1-inch gravel. The three batches containing limestone had water-cement ratios of 0.4, 0.5, and 0.6, and the one batch containing gravel had a ratio of 0.5.

Eleven 3-inch diameter by 6-inch height cylindrical specimens were made per batch according to ASTM C39. Specimens were kept in a moist room for 24 hours and immersed in a water bath. The compressive strengths of specimens at 7, 14, 28, and 110 days were determined.

e. Asphalt Cement Concrete

The Marshall method of designing paving mixtures was used to determine the feasibility of using fine dredged materials in asphalt cement concrete at a range of asphalt contents. A half-inch crushed limestone from Ferguson Quarry, Marshall County, and limestone dust were used as a coarse aggregate and a mineral filler, respectively. Trial and error method was used in blending the aggregates to meet a half-inch nominal size grading requirement specified in ASTM C1663.

f. Stabilization of Dredged Material

Lime and fly ash stabilized sands have been used in construction of base and subbase courses for city streets, highways, airfields, etc. These stabilized sands improve the stability of sand and their costs are relatively low. An additional advantage for runways and aprons is the great thermal resistance of lime and fly ash stabilized bases to the hot exhaust gases from jet planes and rocket missiles. The fly ash obtained from Chicago Fly Ash Company was used in this test. A Type S hydrated lime was used as a secondary additive.

4. Results

a. The particle size distribution curves of a few dredged samples are shown in Figure 16. Curves for all dredged material samples are available from the Iowa Geological Survey.

Only sample 21 met marginally the gradation specifications for concrete sand and mortar sand specified is ASTM C33 and in Iowa Standard Specifications for Highway and Bridge Construction.

However, all samples met the gradation specification for masonry mortar specified in ASTM C144.

The fineness modulus of dredged samples ranged from 2.10 to 2.72. Two samples (Nos. 21 and 22) met the ASTM C33 fineness modulus limits for fine aggregate in construction of between 2.32 and 3.56. Three samples (Nos. 11, 16, and 18) satisfied the fineness modulus requirement of between 1.6 and 2.5 for masonry mortar aggregate in ASTM C144. None of the samples met the gradation specification for a fine aggregate in asphalt concrete specified in ASTm D1073, because of lack of fines passing No. 200 sieve and uniform grading.

b. A petrographic examination of dredged samples from five pools is shown below. Fraction 1 is the portion retained on the No. 10 sieve, Fraction 2 passed the 10 and was retained on the No. 40 sieve, and Fraction 3 passed the No. 40 sieve.

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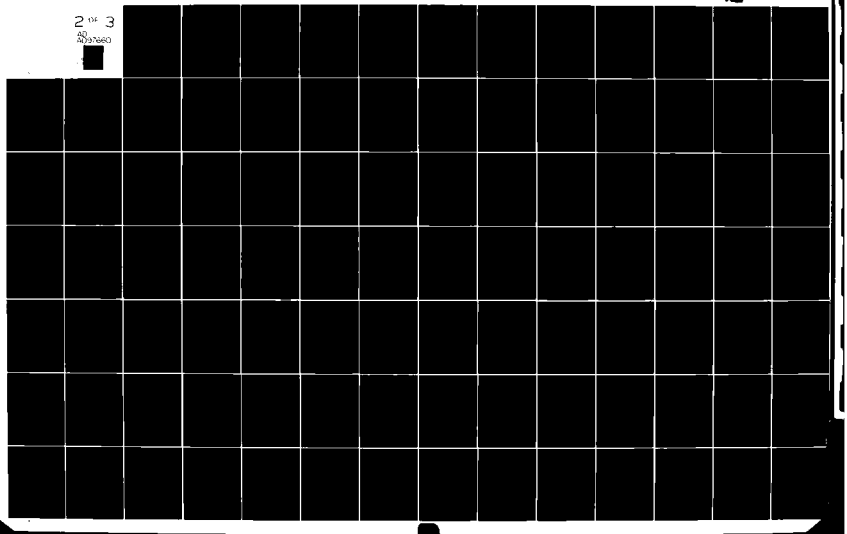


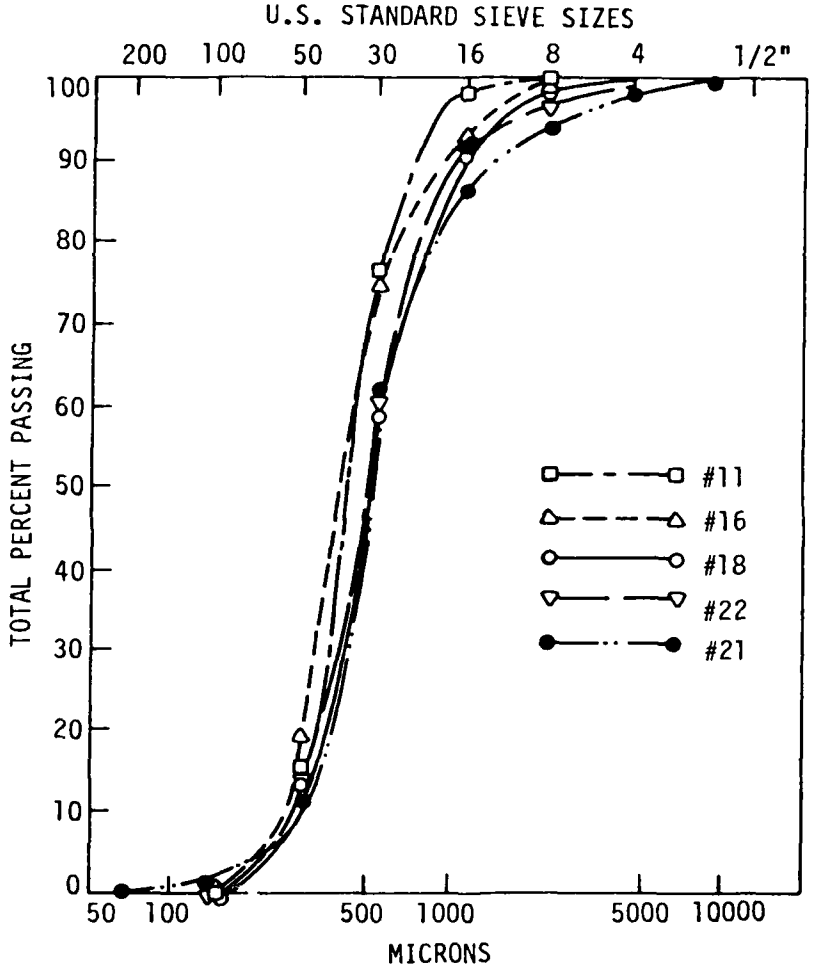


Figure 16. Dredged sample particle size distribution curve.

Major minerals in dredged samples

Sample	Quartz %	Igneous Metamorphic rock %	Manganese oxide coatings %	Chert %
11-1	25	50	18	7
11-2	91	5	4	0
11-3	96	2	2	0
16-1	27	52	9	7
16-2	84	14	1	0
16-3	97	2	1	0
18-1	35	53	2	7
18-2	82	16	1	1
18-3	94	4	2	0
21-1	26	50	8	6
21-2	80	15	4	0
21-3	93	4	2	1
22-2	83	16	1	1
22-3	96	3	0	0

Figure 17

c. Organic Impurities

The tests performed indicated that dredged samples studied did not contain significant amounts of organic matters.

d. Mortar strength

Four samples (Nos. 11, 16, 19, and 22) were used in this test. Cured cube specimens were wiped to surface-dry condition, and loose sand grains were removed from the faces before testing. The results are shown in the table below. Compressive strength shown in this table is an average value of three specimens. Sample 16 shows the lowest strength ratio of 1.16 and Sample 22 shows the highest strength ratio of 1.51.

Fig. 18

Mortar strength of dredged samples

Sample	Water-cement ratio	7-day compressive strength psi	Strength ratio
11	0.37	4628	1.34
16	0.38	4035	1.16
18	0.37	4882	1.41
22	0.38	5226	1.51
Standard sand	0.45	3466	1.00

The Iowa Department of Transportation standard specification requires that the 7-day mortar strength ratio should exceed 1.5 for portland cement concrete pavement and should not be less than 0.9 for mortar. As the results show, all dredged samples met the requirement for mortar, however, only Sample 22 can be considered suitable as a fine aggregate in portland cement concrete pavement, based upon existing

specifications.

e. Portland Cement Concrete

The mix design data of the portland cement concretes made with dredged materials are summarized in Table 3. The Portland Cement Association suggested cement content factors for air-entrained concrete of medium consistence at water-cement of 0.4, 0.5, and 0.6 are 715, 570, and 475, respectively. At a water-cement ratio of 0.4, Samples 16, 21, and 22 yielded concrete of relatively high cement factors, however, Samples 11 and 18 produced concrete of relatively low cement factor. At water-cement ratios of 0.5 and 0.6, all concretes made with dredged samples had lower cement content factors than the suggested average cement factors. These results suggest that dredged material samples require less cement as fine aggregates in concrete at water-cement ratio of between 0.5 and 0.6

The relationships of compressive strength versus water-cement ratio are given in Figure 19. Sample 22 showed the lowest compressive strength at water-cement ratio of 0.5 and 0.6 and highest strength at a water-cement ratio of 0.4. Sample 11, the most round and smooth sample, yielded the lowest compressive strength at 0.4 water-cement ratio.

The results obtained from dredged samples were compared with strengths suggested by the Portland Cement Association for normal air-entrained concrete in Figures 20(a) and 20(b). Figures 20(a) and 20(b) represent the 7-day and 28-day compressive strength, respectively. The compressive strengths made with dredged samples, except 28-day strength of Sample 22 at a 0.5 water-cement ratio, lied in the range of the

	Sample	w/c	Unit weight (pcf)	Cement factor (lbs/cu-yd)	Wt. % fine aggregate	Slump (in)	Air (%)
Limestone	11	0.4	149.4	590	32.4	2.6	6.0
		0.5	150.8	513	34.5	2.1	4.9
		0.6	150.3	396	34.0	1.3	5.4
	16	0.4	151.8	796	33.3	2.8	4.5
		0.5	149.2	507	34.5	2.5	6.5
		0.6	147.4	389	33.9	2.4	7.6
	18	0.4	150.6	714	34.0	2.7	5.2
		0.5	148.7	475	33.6	2.5	7.0
		0.6	145.7	357	33.5	2.0	8.0
	21	0.4	152.1	744	34.0	2.6	4.1
		0.5	150.6	537	34.0	2.0	5.1
		0.6	148.6	415	33.9	2.0	6.1
	22	0.4	151.5	745	33.2	2.7	4.0
		0.5	145.3	489	33.6	2.5	8.1
		0.6	147.4	394	34.2	2.4	6.4
Gravel	11	0.5	149.9	438	33.9	2.5	5.8
	16	0.5	150.7	474	33.6	2.8	5.7
	18	0.5	149.4	428	33.8	1.9	6.0
	22	0.5	147.8	433	33.6	2.4	7.0

Table 3. Portland Cement Concrete Mix Characteristics

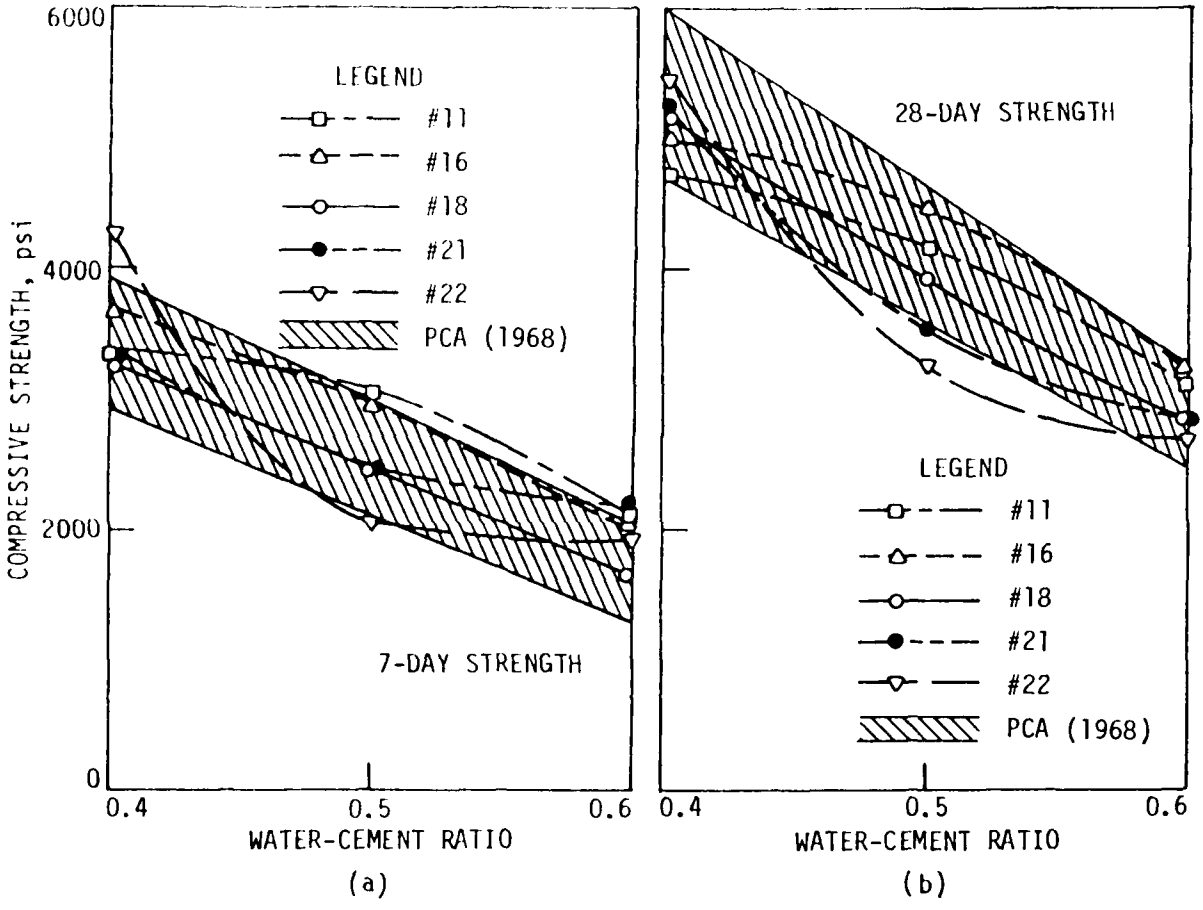


Figure 19. Compressive strength versus water-cement ratio of portland cement concrete.

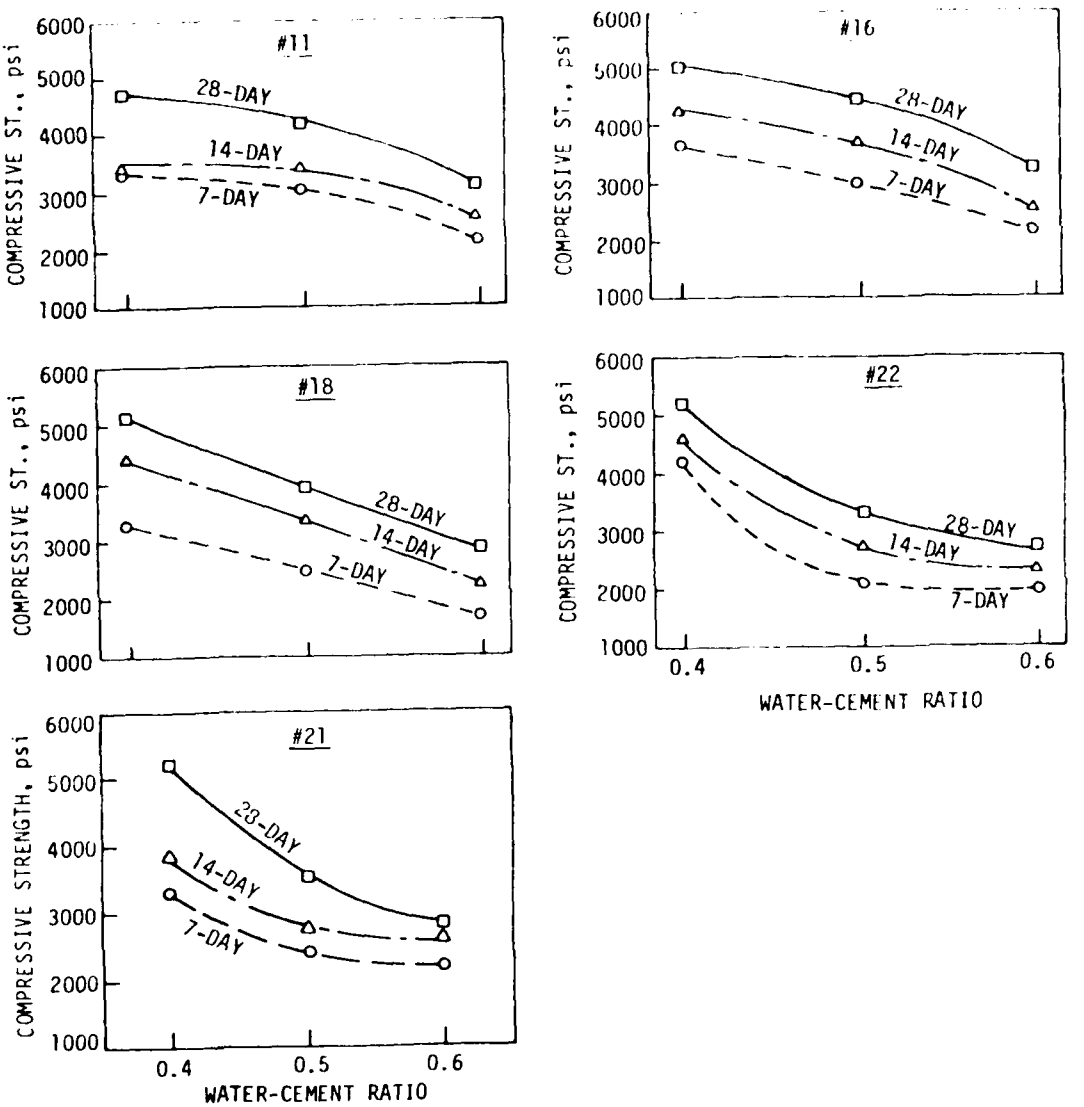


Figure 20. Comparison of compressive strength between portland cement concrete made with dredged material and normal concrete.

compressive strength of normal concrete. This indicates that the compressive strength of concrete made with dredged samples can be compatible with those made with normal concrete sand.

f. Asphalt Cement Concrete

The properties of asphalt cement used in this study are given in Table 4. The results of the Marshall test are shown in Figure 21.

Table 4. Properties of asphalt cement

Properties	
Penetration, 77/100/5	92
Specific gravity, 77/77	0.999
Viscosity at 77°F, megapoise	1.22
Viscosity at 140°F, poise	2060
Softening point, °F	119.5
Flash point, coc, °F	655
Thin film oven test, residue penetration	6262
Spot test	negative

g. Stabilization of Dredged Material

Unconfined compressive strength versus lime content and lime-fly ash ratio at constant sand to fly ash ratio of 3 to 1 are shown in Figure 22.

Portland cement was added to fly ash-lime treated dredged sand mixtures in order to accelerate the initial rate of strength. Relationships of compressive strength versus fly ash

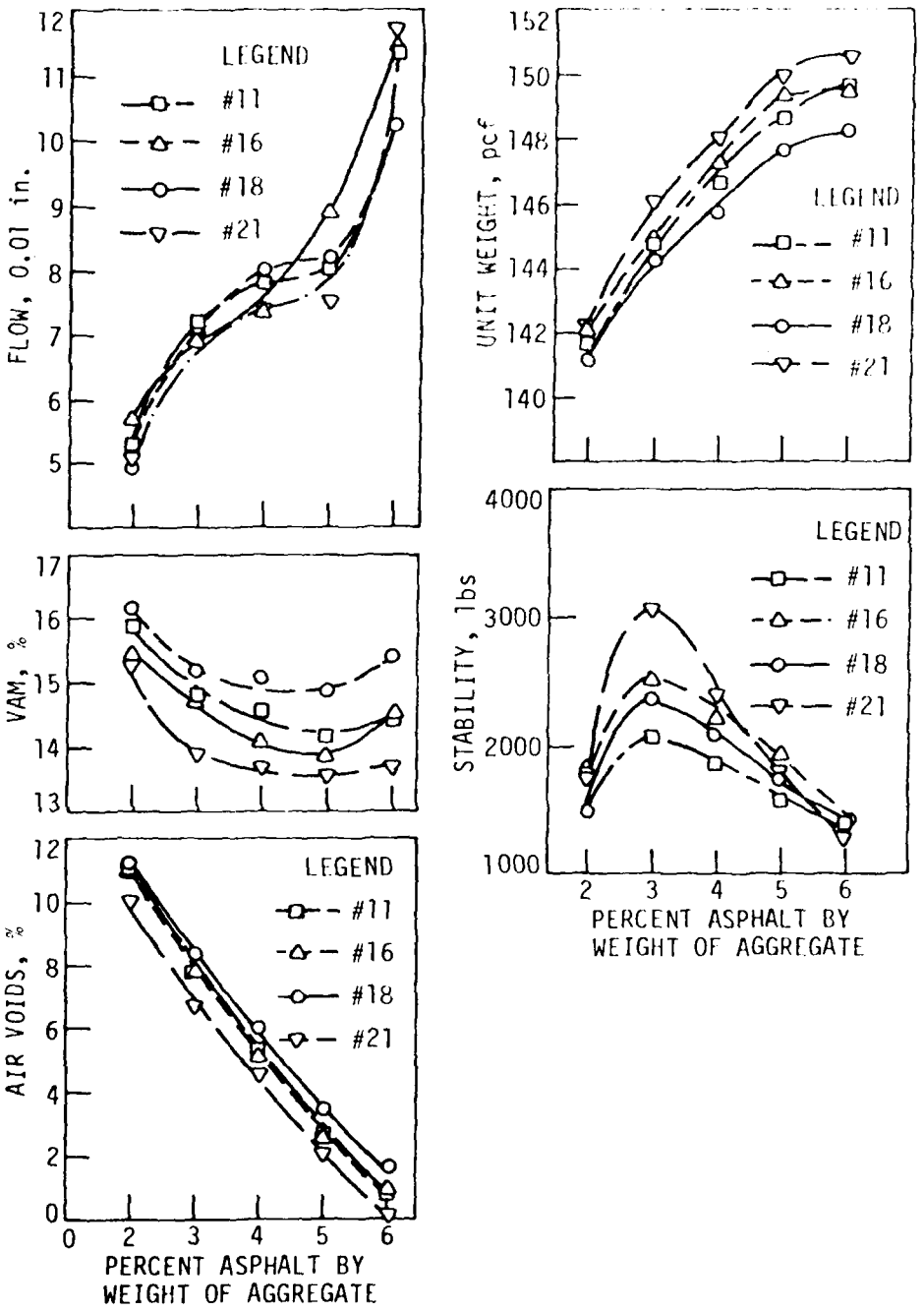


Figure 21. Marshall properties of asphalt cement concrete containing dredged materials.

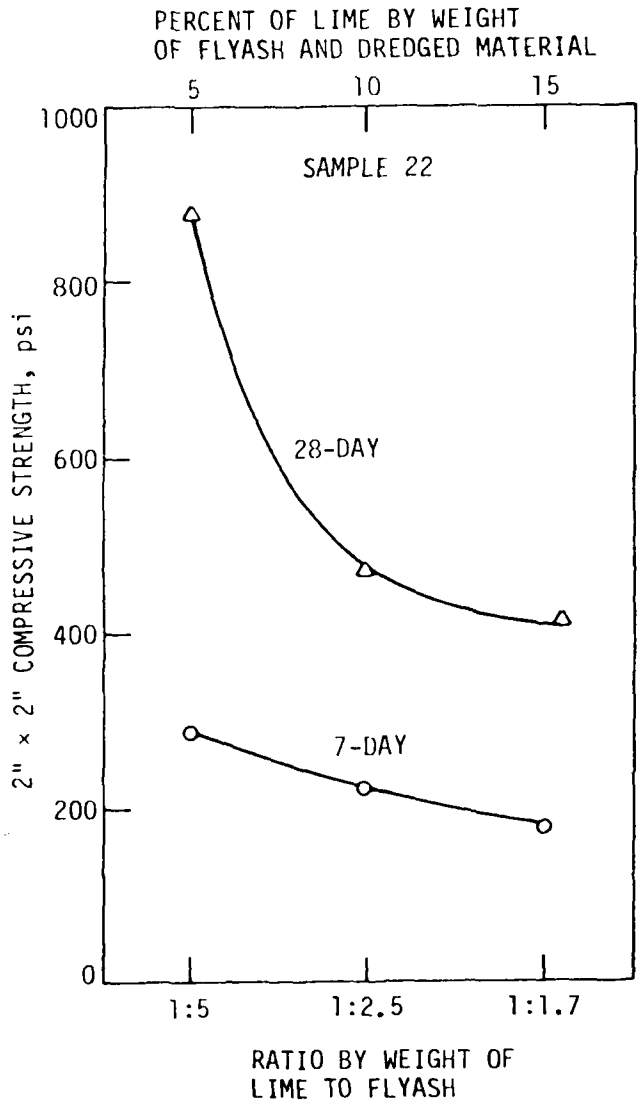


Figure 22. Compressive strength versus lime content and lime-fly ash ratio of treated Sample 22 (fly ash:sand = 1:3).

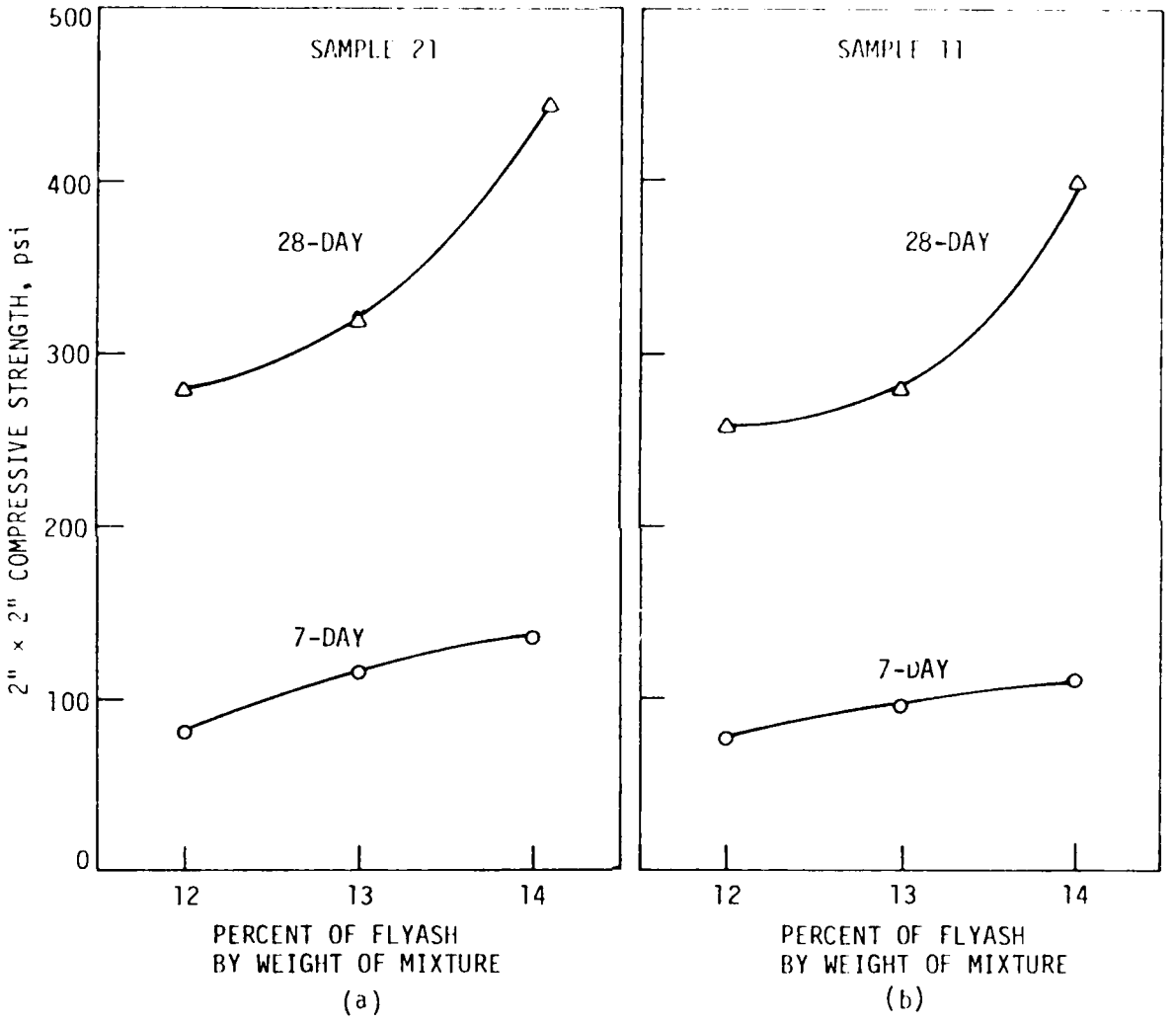


Figure 23. Compressive strength versus fly ash content of treated (a) Sample 21 and (b) Sample 11.

content of lime-fly ash-cement treated dredged materials are shown in Figure 23. Compressive strengths of both Samples 21 and 11 increased with increasing fly ash content. It indicates that fly ash furnishes the pozzolan for pozzolanic reactions and one percent increment of fly ash contributes around 70 psi to the 28-day unconfined compressive strength of specimen.

The British Road Research Laboratory suggested the minimum 28-day compressive strength of 250 psi for lime-fly ash-soil mixtures for base and subbase in highway construction. Since all specimens made with Samples 11, 21, and 22 showed the higher compressive strength than the suggested value, it can be concluded that dredged sands used in this study can be stabilized with lime and fly ash satisfying the compressive strength criteria.

5. Conclusions

The objective of this research was to investigate the suitability of dredged materials along the upper Mississippi River as fine aggregates in construction. Five dredged samples (pools 11, 16, 18, 21, and 22) were used in this study. Each sample number represented the pool where dredged samples were collected.

After basic properties of dredged samples were determined, organic impurities and mortar strength tests were performed. Portland cement concretes and asphalt concretes containing the dredged samples were made and evaluated. Stabilization of dredged material was tested. These results were tabulated and analyzed. The following conclusions were drawn from investigation.

1. Five dredged samples used in this research were relatively uniform and can be classified as

poorly-graded sands.

2. Sample 22 was the most angular and rough sand, and Sample 11 was the most round and smooth sand.
3. All dredged samples were free from organic impurities, therefore there will be no possible danger of harmful effects due to organic matter interferring with the strength.
4. Only Sample 22 satisfied the Iowa mortar strength specification for portland cement concrete pavement with minimum strength ratio of 1.5. However, all samples met the suggested strength ratio of 0.9 for mortar.
5. Compressive strengths of concrete specimens made with dredged material were comparable with those of normal concrete even though the former showed relatively low cement content.
6. Except for a low voids in mineral aggregate (VMA) value, the asphalt concrete mixes satisfied all the design criteria, recommended by the Asphalt Institute, at a 4.5 percent asphalt content. Since low VMA can be increased by proper adjustment of the aggregate grading and calculated asphalt film thicknesses were more adequate for durability, dredged material can be used in asphalt cement concrete pavement.
7. Dredged material can be stabilized with lime and fly ash. The unconfined compressive strength of dredged material can be increased by using the optimum amount of lime and fly ash mixture at its optimum moisture content.
8. In conclusion, dredged material should be considered as a satisfactory fine aggregate source rather than a waste product.

C. Legal Study

A study titled "State and Federal Restrictions on Dredge Spoil Placement in the Upper Mississippi River Area" by Suzan M. Stewart was prepared for the Dredged Materials Uses Work Group. It was completed in May 1978. The scope of the study encompassed the laws of the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, pertinent federal statutes; and local ordinances of river towns and counties. Those areas of the law that would be most likely to affect dredge material placement were identified and analyzed. A detailed summary of the study is presented in the 1979 Conditions (Existing Regulations which Affect Material Disposal and Use) section of this report. A copy of the complete study is available from the Iowa Geological Survey office.

The study did not completely answer the question of what the Corps liabilities are if dredged material is made available to either public or private entities, and such availability interferes with an existing market and distributor of sand. The work group recommended (recommendation 4502) that a legal review be initiated by the Corps to determine what the liabilities are. The RID Corps has initiated such a study, which should be completed by 1981.

D. Disposal Site Selection

1. Introduction

GREAT was organized partly because of the opposition of various agencies and states to disposal sites and dredging methods used by the Corps of Engineers. Most of the historical disposal sites are located either in the river, on islands, or on the river banks where productive uses are generally limited to beach creation or maintenance. When material is deposited as it has been, erosion of the site may be severe, resulting in sand washing back into the main channel or backwater areas.

2. Scope

It was the purpose of this study to look for a series of potential disposal sites that if utilized would maximize beneficial uses of material and minimize negative effects on the river environment. The only criteria used by the DMUWG is selecting sites were that the site could be a possible productive use site (stock pile or direct use) and that it be accessible to possible users. In some cases temporary stock pile sites were designated on island with the idea that once the sites were filled the material could be transported to an on-land site.

3. Methods

a. Site Identification and Presentation

All potential disposal sites in the study area were mapped, photographed, and indexed on 1"=500' scale aerial photographs by the Dredged Material Uses Work Group from May - September, 1978. Sites were designated by three prefixes - D, HD, and TF. 'D' represents a new disposal site that has been reviewed by

all the work groups, 'HD' represents a historic site, and 'TF' represents a disposal site that was selected and reviewed by the Disposal Site Selection Task Force. For each dredge cut sites were selected that were Historic types, Flood Plain types, and Out of Flood Plain types in order to provide a complete representation for all the kinds of sites available for disposal.

The aerial photographs had all potential disposal sites, historic sites, and dredge cut zones mapped on them. Photographs of all potential sites were attached to the maps. Along with the maps, field descriptions of each site and site evaluation forms were presented, an example of which is shown on the following page. The forms were partially filled out by the DMUWG and along with copies of the disposal site maps were sent to the R.I.D. Corps of Engineers and the U.S. Fish and Wildlife Service in Rock Island, Illinois, so that all work groups could check them out and review the sites.

b. Site Review

In order to review the sites all work groups had to develop site evaluation criteria (IGS office). After applying their criteria to a site a determination was made as to whether the site was acceptable or not, with objectionable characteristics being listed on the evaluation form (Table 5). Summary sheets of all the evaluations are available from the Iowa Geological Survey office.

A disposal site selection task force was created by GREAT II and chaired by the Dredged Material Uses Work Group. Active members were the Fish and Wildlife Mgt. - Side Channel work

Pool 13 DISPOSAL SITE EVALUATION FORM Work Group

Site Number	Location	Acreage	Depth of Fill	EST. CAPACITY	In/Out Flood Plain	Land Use	Beneficial Use Possible	Site Accepted	Criteria not met even though site accepted	Site Rejected	Criteria not met	Other
D1	RDB R.M. 555.5	10.7	10(ft)	Cu.Yd. 173,148	? IN/OUT	Cultivation						
D2	RDB R.M. 554.3-555.5	125.2	12	2,424,445	OUT	Cultivation						
D3	RDB R.M. 554.3-555	16.1	10	259,259	IN	Housing Development	Fill Mat. and/or Agg. Fines					
D4	RDB R.M. 552.7-553	44.1	3	213,333	IN	Corps. Rec. Area	Possible Beach Const.					
D5	RDB R.M. 552.7	9.6	10	108,056	OUT	Cultivation						
D6	RDB R.M. 552.4	3.4	15	83,333	OUT	Marsh-Pond						
D7	RDB R.M. 552.4-552.6	18.5	15	447,222	OUT	Marsh-Pond						
D8	RDB R.M. 552 -552.3	19.7	5	158,796	OUT	Cultivation						
D9	RDB R.M. 551.8-552	54.8	15	1,326,389	IN	Cultivation						
D10	RDB R.M. 552.1-552.4	2.8	10	44,444	OUT	Ditch--Wild-life Habitat						
D11	RDB R.M. 551.8-552	20.3	5	163,889	OUT	Cultivation						
D12	RDB R.M. 551.4-551.7	53.3	10	859,259	IN	Cultivation						

Table 5

Pool 13 DISPOSAL SITE EVALUATION FORM Work Group

Site Number	Location	Acreage	Depth of Fill	EST. CAPACITY	In/Out Flood Plain	Land Use	Beneficial Use Possible	Site Accepted	Criteria not met even though site accepted	Site Rejected	Criteria not met	Other
D13	RDB R.M. 551.2	15.6	6	151,111	IN	Woodland-Wildlife Habitat						
D14	RDB R.M. 550.9	11.9	10	192,593	IN	Underbrush Wildlife Habitat						
D15	RDB R.M. 549.0-549.4	266.3	30	12,888,888	IN	Cultivation						
D16	RDB R.M. 548.6-549	84.5	30	4,088,889	IN	Cultivation						
D17	RDB R.M. 548.6-548.7	5.5	25	222,222	IN	Woodland Wildlife Habitat						
D18	RDB R.M. 548.0-548.6	63.4	10	1,022,222	IN	Cultivation						

Table 5

groups and the Dredging Requirements - Materials and Equipment Needs work groups. The objective of the task force was to re-evaluate all the disposal sites, dredge cuts, and material demands, taking into consideration work group evaluations, and recommend short and long term disposal sites for each dredge cut, in addition to selected disposal sites for each planning category (historic, flood plain, remove from flood plain). Present day equipment limitations were ignored when considering long term sites and alternative methods of transport of sand were examined by the material and equipment needs work group in the hopes of being able to select the piece(s) of equipment that could dredge, transport, and dispose of material in such a manner that productive uses of material could be maximized and environmental damage minimized in a cost effective manner. A complete review of the procedures is given in the Plan Formulation Work Group Technical Appendix.

4. Results

The Disposal Site Selection Task Force determined that if the Corps had equipment that could hydraulically transport the material a minimum of 3 miles nearly all demands for dredged material could be met. Those demands that couldn't be met hydraulically could be satisfied by using barges. As a result of this nearly all potential disposal sites are within three miles of a dredge cut. If at a later date it is shown that alternative methods of dredging and disposal are more acceptable, then the procedures used in selecting sites for this study can be applied.

Site recommendations from the task force were presented to and reviewed by the Plan Formulation Work Group of GREAT II. At this time all work groups had the opportunity to accept or reject the task force recommendations. Summary sheets for a dredged material disposal plan were developed on a pool by pool basis after potential site selections were approved. In order to be utilized a site has to be both economically and environmentally justified by members of GREAT. An explanation of the summary sheets and the sheets themselves are presented in the Plan Formulation Technical Appendix.

5. Conclusions

The Disposal Site Selection Task Force determined that a hydraulic dredge with a three mile transport capability coupled at times with barging could satisfy much of the demand for material in the study area and at the same time remove the sand from sensitive areas. Potential long term disposal sites were selected with the above equipment capabilities in mind. Based upon the disposal plans cost and impact information presented in the Plan Formulation Technical Appendix, it is felt that the three mile transport plan is not totally economically or environmentally justified at this time. If present methods (last five years) of dredging and disposal are used for the next fifty years (assuming no change in the river system, recreation usage, sand value, or environmental impacts) the cost of dredging and transport will be $20,000,000 (RID-COE). The dollar benefits to be derived from these actions will be $30,386,250 (mainly recreation benefits). This compares to a potential long term selected plan cost of $59,879,700 with benefits of $38,529,000. If the long term plan is implemented the environmental impacts are

not drastically reduced based on current data. 1,150 acres less of open water, 4 acres less of deep marshes, 9.5 acres less of terrestrial vegetation, 28 acres more of woody vegetation, and 124 acres more of agricultural land will be affected if the 50 year long term plan is implemented to replace existing methods. Based on available information, the impact of open water disposal is minimal although further research may uncover more effects.

Although in most portions of the study area there is an adequate supply of sand, it is a non-renewable resource. As such, supplies will eventually dwindle and demand may eventually increase. When that happens, the value of sand will increase. Also, as time goes on cumulative environmental impacts may become more severe, or more information may be gathered to document the severity of existing impacts. With increasing gasoline prices it is possible that recreational use (mainly boating) on the river may not increase in popularity as expected, affecting recreation dollar benefits derived from maintaining beaches.

Although the three mile transport channel maintenance plan is not justifiable today, that will not be the case in the future. A total barging plan may be feasible if the value of sand or environmental impacts increase to the point where the extra cost of transport and disposal is offset by the benefit derived from such an action. If sand values and environmental impacts change in the future, three mile transport of material may be feasible. The DMUWG suggests that such an action will be feasible when there is a break-even point reached between the value of sand and extra cost of transport and disposal. Equipment should be

acquired to transport the material two miles when justified, three miles when justified, etc. Until further transport is justified, though, the Corps should make every effort to reach as many sites as possible in the existing long term plan.

Demand for dredged material may change as time goes on. If this happens, new sites close to the demand will have to be selected. The sites presented on the Disposal Plan Summary Sheets are approved sites, but it is not required that only they be used. Again, the procedures have been established for selecting sites, and it is recommended that it be used for all future site selections.

Depending on the types or categories of sites utilized, varying levels of dredged material requests can be satisfied. As shown in Table 6, if a historic type plan is utilized 31% of the requests can be satisfied, if the long term plan is used 52% of the requests can be satisfied, etc. The plans represent a compromise among all work groups and as a result not all demand requests have been incorporated. The work still strongly recommends (recommendation 4504,4504) that beneficial use sites be utililized as it is felt that the best way to reduce adverse environmental disposal impacts is to remove the material from the system.

The following tables show the beneficial use requests that could be met using either planning alternatives (Table 6) as a selected plan. The figures used in the Beneficial Use Requests Met table was obtained in the following manner.

a. Total Requests (by pool):

These figures include requests obtained through the DMUWG Market Study and all requests for material from the Recreation Work Group.

Beneficial Use Requests That Could Be Met per Each Planning Alternative

Assume "Current Dredging" makes material available to all Recreation Beach Requests

(65 sites)

Pool	Total Requests	Hist	FP	RFFP	ST	LT
11	12	4	5	5	6	5
12	8		1	2		3
13	16	8	5	5	7	8
14	19	5	9	6	9	10
15	7	2	1	1	2	2
16	11	4	5	2	5	5
17	12	2	3	1	3	2
18	20	5	8	9	8	10
19	20	8	11	8	11	11
20	10	2	7	6	8	7
21	7	6	4	2	7	7
22	10	2	5	5	3	6
Total	152	48	64	52	69	76

Table 6

b. Planning Alternatives

Each planning alternative contains the number of beneficial use requests that can be met by that alternative. Disposal sites are taken from the dredged material disposal plan summary. (See Plan Formulation Technical Appendix.) Each beneficial use request is counted only once per pool even though there may be more than one disposal site selected that could be used to satisfy that demand. Requests from both the DMUWG Market Study and the Recreation Work Group are used as beneficial use requests.

E. Work Group Meetings

The groundwork for work to be accomplished was agreed upon at the March 15, 1978 meeting. Few formal meetings were required after that date as work objectives were straightforward. Most members of the work group were contacted at least once a month to inform them of progress on study items, and at times were called upon to provide input from their field of expertise. As explained in the Work Group Organization section of the appendix, up to six full time GREAT II funded and DMUWG managed personnel have worked on DMUWG Studies, necessitating daily meetings as opposed to monthly meetings.

The DMUWG chaired the Disposal Site Selection Task Force, and as such held a meeting on the average of once every three weeks since late 1978. Formal minutes of the meetings are not provided as the meetings consisted of disposal site discussions and selection. Results of the meetings are presented in the previous section (Disposal Site Selection).

IV. A. FORMULATION OF ALTERNATIVE SOLUTIONS & DEVELOPMENT OF RECOMMENDATIONS PROCESS

The tasks that each work group chose to accomplish varied by work group, by type of problem they were addressing and by the existing knowledge they had about that problem. All work groups needed to collect and organize background information. This background information was used to identify further problems, to provide input and data for other work groups and as part of the narrative for their work group appendix. Where little background information existed, baseline data was collected and/or research studies conducted.

As all tasks were completed, the results were distributed to members of the pertinent work group. Conclusions were then drawn by members of the work group based on the results of their work groups' tasks.

The conclusions developed by each work group led to the identification and consequent development of potential alternatives to their problems. The results of some tasks indicated that there still was not enough available information to ensure a knowledgeable assessment of the potential alternative solutions to a problem. In these cases, no alternatives could be formulated and the only recommendation which could be made was for further study of the problem. Where completion of work group tasks led to identification of potential solutions, the alternatives were displayed on Attachment 4. The alternatives varied in specificity from site specific guidelines to general policy changes, dependent upon the problem they were addressing. Alternatives displayed on Attachment 4 were assessed and an alternative selected on the basis of a judgmental impact assessment. Once an alternative was selected; the rationale for its selection and all available supporting documents, information and studies supporting its selection were identified and displayed on Attachment 4. This information

(and other), was used to compile a brief summary of the types of impacts that would result if the recommendation were implemented. Based on the impact assessment and careful evaluation of the recommendation the work group, through various voting procedures, either approved or rejected the recommendation.

All work group approved recommendations were sent to the GRLAT II impact assessment coordinator for review and advice. The coordinator would then mail this information, complete with comments, back to the appropriate work group chairman. The work group then did a more thorough and detailed assessment of the impact potential of their recommendations. This information was recorded on Attachment 7. Each work group was responsible for obtaining or estimating the necessary information for their impact assessment through their studies, work group meetings, discussions with other work groups, discussions with other agencies having expertise in the particular field, discussions with economists and discussions with the impact assessment coordinator. When Attachment 7 was completed to the work groups' satisfaction, sufficient copies of Attachment 4 and 7 were brought to the next Plan Formulation Work Group meeting. The impact assessment was reviewed by all members present and additions, changes or suggestions were made to the impact assessment. Each work group chairman made the appropriate revisions and brought a final version of the impact assessment to the next Plan Formulation Work Group meeting for final review.

At this time, these recommendations were dropped from further active consideration, until all recommendations were submitted by all of the work groups. When all of the recommendations had been submitted to the Plan Formulation Work Group, the development of integrated and final plans began.

The recommendations brought to the Plan Formulation Work Group varied

in specificity and implementability and were grouped into the following general categories:

1. Implementable actions with existing authority
2. Implementable actions requiring legislation
3. Implementable studies within existing authority
4. Implementable studies requiring legislation
5. Feasibility studies, etc.
6. Policy changes

Within each of six groups above, the recommendations varied from general recommendations applying to the river as a whole to those recommendations applying to the river as a whole to those recommendations site specific in nature. Three categories of specificity used to help organize the recommendations into action plans are listed below:

1. general - apply to entire GREAT II reach or entire Upper Mississippi River Basin
2. pool - apply to a specific pool or group of pools
3. site - apply to a specific site(s) within a pool.

The following recommendations represent those of the Work Group before they were modified by the Plan Formulation Work Group in the plan development process.

SUMMARY FORMAT

Problem # 1

Problem: Dredged material in the GREAT II study area has not been adequately sampled and described. Constituents and properties need to be determined.

Original priority # 1 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #2: Analyze and describe constitutents and properties of dredged material - sediment samples from 11 pools - sieve and mineralogical analyses.

Task #4: Aggregate study by Iowa State Univ., Civil Engineering Dept.

Results: Dredged material sieve analyses
Dredged material mineralogical analyses
"Waste Dredged Material for Construction" by Pyun-Hi Chung

Conclusions: Dredged material should be considered as a satisfactory fine aggregate source rather than a waste product.

Resultant Recommendations:

4503

Implementation requirements:

The RID Corps should use dredged sand in their construction projects whenever possible. The Corps should also be promoting dredged sand as a valuable product.

Does recommendation solve the problem?

Partially

If no, describe further needs and/or studies:

State-Federal specifications for fine aggregate may have to be changed to allow widespread use of the dredged material.

SUMMARY FORMAT

Problem # 2

Problem: New productive uses have to be developed for dredged material, taking into account the unpredictable delivery time for material.

Original priority # 2 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)
Task #4: Aggregate Study - Determine productive uses for dredged material.
Task #1: Market Study - Determine demand for dredged material.

Results: "Waste Dredged Material for Construction" by Pyung-Hi Chung, ISU
Market study determining demand for dredged material.

Conclusions: Dredged sand can be used for portland cement concrete aggregate, asphaltic concrete aggregate, mortar sand, road sanding material, levee construction material, beach maintenance, and construction fill. In many pools demand exceeds supply.

Resultant Recommendations:

4503
4504

Implementation requirements:

RID Corps has to promote the dredged material as a valuable product.

Does recommendation solve the problem?

Yes

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 3

Problem: Total river demand for dredged material is not known. Demand has only partially been determined within radius of existing dredging equipment pipeline reach.

Original priority # 3 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study - Determine demand for dredged material by cities, counties, states, sand and gravel producers, and in some area private citizens.

Results: Market study presented in DMUWG Appendix. Demand for and value of dredged material on a pool by pool basis is shown.

Conclusions: In pools 11, 12, 14, 15, 16, and 17 all the dredged material would be utilized if made available.
The average value of sand in the study area is $2.62 per cubic yard (1978 dollars).

Resultant Recommendations:

4503
4504
4505
4506

Implementation requirements:

The RID Corps must make every effort to dispose of material in locations where it could be put to a productive use -- in this manner, demand for material will eventually increase.

Does recommendation solve the problem?

Yes, although demand may change in future years.

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 4

Problem: Very few disposal sites have been used in such a manner that the material could be made available for a productive use. All existing sites are selected by considering only existing equipment limitations.

Original priority # 5 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)
Task 1: Market Study - Determine demand for dredged material
Task 5: Prelim. disposal site selection - map all possible disposal sites
Task 6: Final disposal site selection

Results: Productive uses and demand for dredged material has been determined. Disposal sites have been selected that can be potentially used as productive use sites.

Conclusions: If dredged material is made available by disposing of it at work group selected disposal sites it will be put to a productive use in most cases.

Resultant Recommendations:

4501
4502
4504
4505
4506

Implementation requirements:

The RID Corps must purchase or be allowed to use the disposal sites selected by the DMUWG and Plan Formulation Work Group.
New equipment must be purchased to enable the Corps to dispose of material at the selected sites.

Does recommendation solve the problem?

Partially

If no, describe further needs and/or studies:

The Corps must purchase new equipment.

SUMMARY FORMAT

Problem # 5

Problem: Information has not been assembled, analyzed, and made readily available on legal restrictions or present day policies on dredge spoil transport and placement.

Original priority # 7 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #3: Legal Study - Discussion of applicable laws of states of Illinois, Iowa Minnesota, Missouir, and Wisconsin; pertinent federal statutes; and local ordinances of river towns and counties.

Results: "State and Federal Restrictions on Dredged Spoil Placement in the Upper Mississippi River Area" - Suzan M. Stewart.
DMUWG analysis of present day Corps policy regarding disposal of dredged material.

Conclusions: In order to generate demand for dredged material placed at selected disposal sites, the Coprs should modify it's present day dredged material disposal policy.

Resultant Recommendations:

4501
4502

Implementation requirements:

Corps must modify its dredged material disposal policy. Corps must initiate a further legal review to analyze the problem of potential interference with private industry.

Does recommendation solve the problem?

Yes, in part.

If no, describe further needs and/or studies:

The Corps must institute an additional legal review in an attempt to resolve the problem of the proposed disposal plan potentially interferring with existing sand and gravel companies markets.

SUMMARY FORMAT

Problem # 6

Problem: A market study is needed but is not available on sand and gravel producers for dredged material.

Original priority # 6 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study - Determine demand for dredged material. Studies to include cities, counties, states, and sand and gravel producers in the study area.
- Determine approximate value of the dredged material at the disposal site.

Results:

An estimate of 50 year demand for dredged material was determined. Demand exceeds supply in pools 11, 12, 14, 15, 16, and 17. The average value of sand in the study area is $2.62/cubic yd. (1978).

Conclusions:

Material should be made available to the organizations or agencies that requested it in order to reduce disposal impacts in the river system.

Resultant Recommendations:

4501
4502
4504
4506

Implementation requirements:

In order to satisfy demand for the dredged material and reduce disposal impacts the Corps will have to purchase additional equipment. Present day Corps policy on charging for dredged material will have to be modified.

Does recommendation solve the problem?

Yes

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 1

Problem: Productive Use: a) New and productive uses for disposal material may cut into existing free enterprise markets. b) Unpredictable delivery time for material.

Original priority # 9 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #3: Legal Study
Task #5, 6: Disposal Site Selection
Task #1: Market Study

Results: Many sand and gravel companies are requesting dredged material. Some material will be made available to groups that normally would purchase sand from a commercial supplier. Present day laws do not specifically relate to the competition problem.

Conclusions:

a). It has not been determined what the legal implications are of interferring with free enterprise markets. If selected disposal sites are used there is a good possibility that existing markets may be affected.
b). Stockpile sites will ease the problem of unpredictable delivery time.

Resultant Recommendations:

4502 4505
4503
4504

Implementation requirements:

Corps must initiate an additional legal review to analyze the problem of productive uses of material interferring with existing markets.

Does recommendation solve the problem?

Possibly

If no, describe further needs and/or studies:

If the legal review does not answer the question a test case will have to be initiated.

SUMMARY FORMAT

Problem # 8

Problem: Determine needs for dredged material: should equal study emphasis be given to all portions of the river even though in some areas dredging has never occurred within ten miles of a specific location.

Original priority # 4 out of 16 problems

Was the problem addressed? Yes.

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study

Task #6: Disposal Site Selection

Results:

Demand for dredged material was determined in the study area. All the material dredged in pools 11, 12, 14, 15, 16, 17 would be utilized if made available. Disposal sites were selected that would promote productive uses of dredged material and in most cases reduce disposal impacts.

Conclusions:

If dredged material was disposed of at selected disposal sites, most demand could be satisfied. Barging was recommended in some cases so demand far from a dredge cut could be satisfied.

Resultant Recommendations:

4504
4505
4501

Implementation requirements:

Corps purchase additional equipment to reach selected disposal sites.

Does recommendation solve the problem?

Yes

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 9

Problem: Legal Study: Many legal problems may arise if new uses are found for dredged material. There may be difficulties in disposing of material on private, county, or state land.

Original priority # 8 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #3: Legal Study

Task #4: Aggregate Study

Results: New uses were found for dredged material. Legal solutions to problems that may arise have not been found to date. Procedures required for disposal have been defined in the Legal Study.

Conclusions:

Further analysis and/or legislation is required to deal with additional problems that may arise as dredged material is put to new uses that may interfere with existing markets. Corps must receive permission or acquire land for disposal of dredged material.

Resultant Recommendations:

4501
4502

Implementation requirements:

Corps required to change present day policy relating to disposal of material and charging for it. Corps required to conduct further legal studies as required.

Does recommendation solve the problem?

Yes.

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 10

Problem: Use dredged material to build road on river side of tracks in Cassville.

Original priority # 12 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)
Task # 1: Market Study

Task #5, 6: Disposal Site Selection

Results:

Disposal site D32 was recommended to the Plan Formulation Work Group as a possible productive use site.

Conclusions:

The disposal site was not found to be suitable as costs of containment were excessive and there was a high probability of the dredged material returning to the river system.

Resultant Recommendations:

4504
4505

Implementation requirements:

The city would have to provide a suitable site and as there is a more suitable site nearer to the dredge cut, pay for a portion of the dredging and disposal costs.

Does recommendation solve the problem?

Possibly - If Cassvill will cost-share the project.

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 11

Problem: Sabula, Iowa - Dredge S. Side/fill N. side to expand city. Use channel fill.

Original priority # 13 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study

Task #5, 6: Disposal Site Selection

Results:

Disposal site D27 recommended to satisfy request.

Conclusions:

Cost and environmental impacts are excessive at the site. Alternative disposal sites were selected that were nearer the dredge cut (lower cost) and provided an equivalent beneficial use. The site will be considered if it becomes cost effective to do so and if environmental impacts can be reduced.

Resultant Recommendations:

4504
4505

Implementation requirements:

If it is determined at a later date that the impacts (cost-environment) can be significantly reduced the site can be reconsidered using disposal site selection procedures defined by GREAT.

Does recommendation solve the problem?

Possibly - if implementation requirements can be met.

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 12

Problem:
Need areas for dredged material where the public can get at it.

Original priority # 10 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)
Task #5, 6: Preliminary and Final Disposal Site Selection

Results: Potential productive use sites - accessible to the public -- were mapped by the work group and presented to the Plan Formulation Work Group for analysis.

Conclusions:
A number of accessible sites were approved by the DMUWG and the Plan Formulation Work Group.

Resultant Recommendations:

4501	4505
4502	4506
4504	

Implementation requirements:
In some cases potential sites can be reached with existing equipment -- the Corps only needs to acquire the sites. In other cases additional equipment is required.

Does recommendation solve the problem?
Yes.

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 13

Problem: Possible area for material placement between Dallas City, Ill., and Niota -- possibly good area for recreational development.

Original priority # 14 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)
Task #1: Market Study

Task #5, 6: Disposal Site Selection

Results:
Disposal sites D24, D25, D26, and D27 were recommended and reviewed by the DMUWG and the Plan Formulation Work Group.

Conclusions:
No dredge cuts were in the vicinity and cost to barge to the sites from distant cuts was excessive

Resultant Recommendations:

4504
4505

Implementation requirements:

It must be shown that transport to the site would be more cost effective than other options.

Does recommendation solve the problem?
Possibly - If at a later date it is shown to be economically feasible to dispose at the site.
If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 14

Problem:

Eastern Iowa Power has problem with sediment at docks -- barges cannot get in. They don't know what to do with material that is dredged.

Original priority # 15 out of 16 problems

Was the problem addressed? Partially

If no, reason:

Not totally a problem for the work group -- Commercial transportation, material and equipment needs, and dredging requirements work groups should address the problem.

If yes, tasks: (brief verbal description)

Task #5, 6: Disposal Site Selection.

Results:

Maps of potential disposal sites were sent to Eastern Iowa Power.

Conclusions:

Eastern Iowa Power must find suitable disposal sites -- the sites provided by the work group can be used as a guideline.

Resultant Recommendations:

4505

Implementation requirements:

Eastern Iowa Power must eventually acquire a suitable disposal site.

Does recommendation solve the problem?

No

If no, describe further needs and/or studies:

Eastern Iowa Power must find a suitable disposal site.

SUMMARY FORMAT

Problem # 15

Problem: The Quincy Park District can use all the spoil from dredging that becomes available. We have many sites to suggest.

Original priority # 16 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study

Task #5, 6: Disposal Site Selection

Results:

Disposal sites D7 and HD2 recommended by work group to Plan Formulation Work Group.

Conclusions:

Site HD2 accepted as a long term disposal site.

Resultant Recommendations:

4504
4505
4506

Implementation requirements:

Corps continue disposal as usual from the nearby cut.

Does recommendation solve the problem?

Yes

If no, describe further needs and/or studies:

SUMMARY FORMAT

Problem # 16

Problem: Why not put dredged material on drainage levees to help protect the district in times of high water?

Original priority # 11 out of 16 problems

Was the problem addressed? Yes

If no, reason:

If yes, tasks: (brief verbal description)

Task #1: Market Study

Task #5, 6: Disposal Site Selection

Results:

Many sites on or near levees were recommended by the work group to the Plan Formulation Work Group. Not all segments of all the levees were considered as they were too far from a dredge cut.

Conclusions:

Many selected sites are on or near the levees and as such can be used to stockpile the material either to build up or maintain them.

Resultant Recommendations:

4504
4505
4506

Implementation requirements:

Selected disposal sites have to be utilized. In some cases additional equipment has to be purchased by the Corps.

Does recommendation solve the problem?

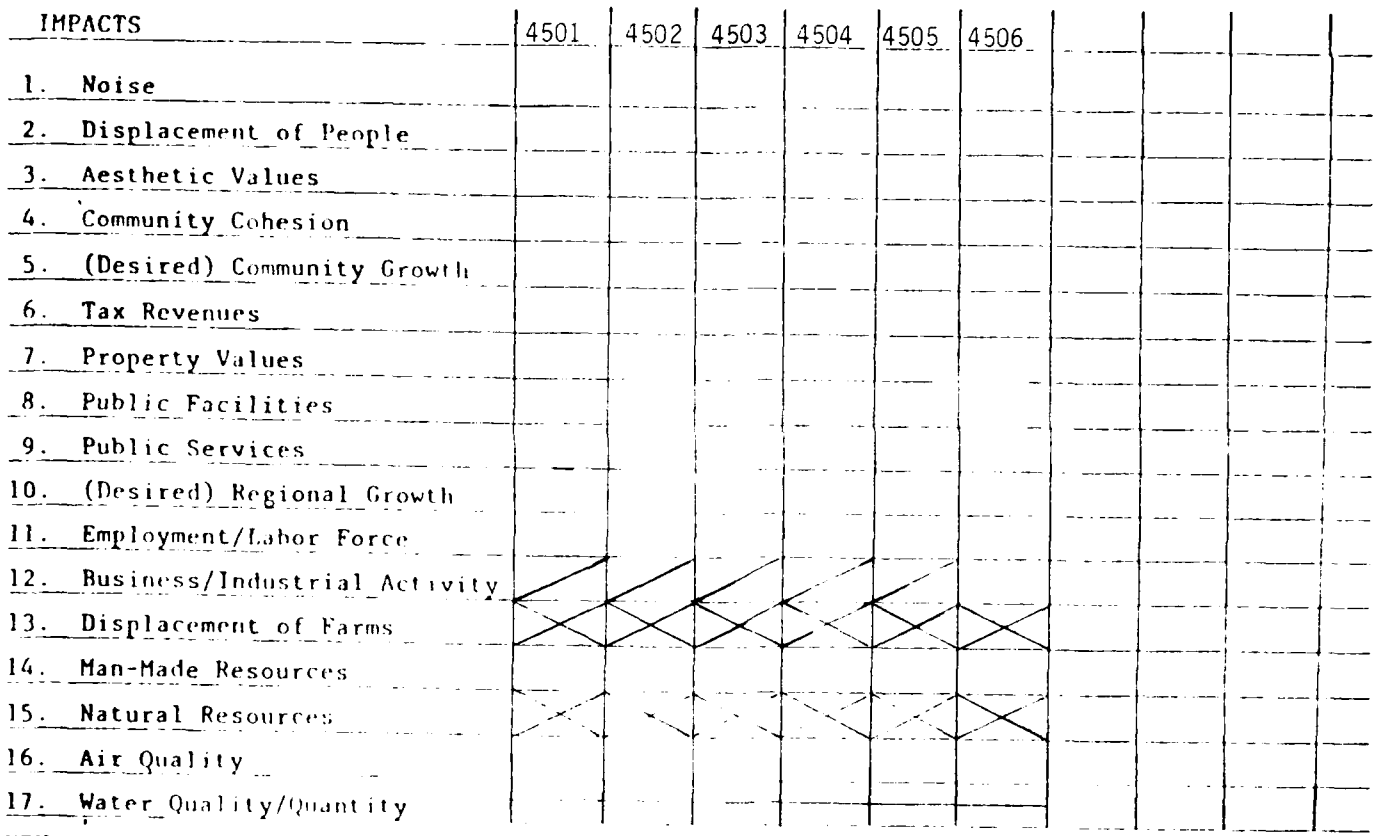
Yes, although not all areas are covered.

If no, describe further needs and/or studies:

IMPACT ASSESSMENT SUMMARY

WORK GROUP

RECOMMENDATION NUMBER



KEY

- Significant Direct Impact
- No direct Impact, Indirect Impacts May Need Further Assessment
- Negligible Direct Impact
- No Direct Impact

NOTE: Significant Direct Impacts and Indirect Impacts which may need further assessment are shown and measured on Attachment 7.

RECOMMENDATION 4501

Corps modify present day policy regarding charging for dredged material transport or putting material up for bid when there is an economically and environmentally justified productive use request. A recommended policy is on the next page.

June 26, 1979

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Attachment #4
DMUWG Work Group

DISPLAY OF RECOMMENDATION & PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4501

Pool Number

River Mile

Date Approved by Work Group

1. General problem addressed (write out & use number from Att. #1):

   b. Legal and policy information and analysis.

2. Sub-problem addressed (write out - use only when necessary):

   Legal Study: Many legal problems may arise if new uses are found for dredged material. There may be difficulties in disposing of material on private, county, or state land.

3. Sub-objective addressed (taken from Att. #2 - write out):

   Study the legal and institutional framework regarding placement of dredged material.

4. Tasks accomplished to address problem (taken from Att. #3 - write out):

   Legal Study

5. Listing of alternatives to problem:

   a. No change in present day Corps policy

   b. All material being made available free of charge, none being put up for bid.

   c. Modify present day Corps policy regarding charging for material transport or putting material up for bid (see attached recommended Corps policy sheet).

   d.

   e.

   f.

   g.

6. Selected alternative C (write in the letter)

7. **Rationale for selection of alternative:**

Beneficial use of material many times will reduce impacts on the environment; beneficial use should be promoted.

Present day policy does not encourage beneficial use as high charges for material will result in fewer beneficial users

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

DMUWG memo regarding Corps policy on dredged material disposal

9. **Rationale for elimination of other alternatives:**

GREAT II is recommending disposal sites for the long term.

These sites and not historic sites should be used to assess costs.

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Increased beneficial use
Increased disposal cost for Corps
User may pay for material if transported beyond long term sites
Corps policy change required
Possible effect on industry
Possible less use of historic sites
Possible reduced environmental impact by promoting use of long term and beneficial use sites

11. **Reason for work group rejection of recommendation:**

SITES SELECTED USING GREAT APPROVED PROCEDURES (hydraulic and barge)

1. If dredged material is made available to a public body, there will be no Corps charge or royalty if the material is used by the public body and not sold to a private enterprise.
2. If private enterprises are interested in the dredged material and the sand is deposited such that it is accessible to industries that requested it, the material will be put up for bid with the highest bid obtaining the material.
3. If a private enterprise will supply a disposal area that will enable the Corps to dispose of material in a site selected using Plan Form procedures, there is no charge for the material, and the material will not have to be put up for bid. If more than one private enterprise will supply an approved disposal site, the material will have to be put for bid.

SITES REQUIRING TRANSPORT BEYOND GREAT APPROVED SITES

1. Private and Public: If due to a request for dredged material the sand is transported beyong a site selected using GREAT procedure, the public body or private enterprise has to pay for the extra cost of transport of the material beyond GREAT approved sites.
2. If a state requires on-land disposal, at sites other than GREAT. Procedure approved ones, the state or a local interest has to privde a suitable disposal area. The Corps will assume the increased dredged material handling costs associated with placing the material in the furnished site.
3. Some states may insist on RFFP disposal; in that event, the state will be advised that it will have to furnish the increased costs if the material is not polluted according to EPA standards. If it is polluted, the COE must pay all costs in order to remove it from the flood plain.

ATTACHMENT #1

RECOMMENDATION # 4501

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5–COL. 4)
Increased beneficial use.	$	Very few disposal sites have been used in such a manner that the material could be made available for a beneficial use. Recreation use only.	Same as present. $30,386,000 Recreation beneficial use.	Many disposal sites would be used in such a manner that material could be made available for a beneficial. $38,529,000 beneficial use value.	+$8,143,000
Increased disposal cost for Corps	$	Usually the least expensive, environmentally suitable disposal site is used with minimal material made available for beneficial use. $20,000,000	Same as present. $20,000,000	Increased disposal cost to Corps in using disposal sites that make material available for beneficial use. $59,879,000.	-$39,879,000
User may pay for material if transported beyond long term sites.	$	If requested dredged material is transported beyond a normal distance-the requester must pay the extra transport cost.	Same as present	If requested dredged material is transported beyond a normal distance to a plan form approved site--the requester should not have to pay extra transport distance.	On a case by case basis users may have to pay for extra transport of material.
Corps policy change required.		Usually the least expensive, evnironmentally suitable disposal site is used with minimal material made available for beneficial use.	Same as present +$10,386,000 net benefit, but environmental degradation continues.	Plan form approved sites should be used for disposal unless a state requires on-land disposal at other than plan form sites. $21,350,000 net cost but reduced environmental degradation.	An adjusted net cost of $31,736,000. Reduced environ degradation. 1232.5 sensitive environment acres notdisposed on.

ATTACHMENT #7

RECOMMENDATION # 4501

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5–COL. 4)
Possible less use of historic sites	acres	Majority of sites used for disposal are historic sites	same s present	Reduction in the use of historic sites	Little used (by recreationists) sites will not be maintained. 149.7 acres less will be used.
Possible reduced environmental impact by promoting use of long term and beneficial use sites.	acres	No change	same as present Acreages Impacted Open Water 1410 Deep Marshes 8.3 Terrestrial 20 Woody Veg. 116.4 Developed 18.4 Dredged Material 267.4	Transport dredged material normally placed at environmentally adverse disposal sites to beneficial use disposal sites. Acreages Impacted Open Water 266.4 Deep Marshes 4.5 Terrestrial 10.7 Woody Veg. 144 Agric. 113.9 Developed 152 Dredged Material 117.7	Net Acreages Impacted Open Water -1143.6 Deep Marshes -3.8 Terrestrial -9.3 Woody Veg. 27.6 Agric. 113.9 Developed 133.6 Dredged Material -149.7

ATTACHMENT #1

RECOMMENDATION # 4501

LOCATION (RIVER MILE)_____

POOL _____

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
Business and Industrial Activity	$/cu.yds	$2.50/cu yd historic disposal cost for 2,390,000 cu.yds. = $5975,000 cost.	same as present	Possible increase in industrial activity making use of this less expensive resource cost= $13,238,000 value= $6,261,800 benefit=$-6,976,200	cost= $7,263,000 value= $6,261,800 Benefit=$-1,001,200
Displacement of farms	acres	No impact	same as present	113.9 acres impacted	113.9 acres impacted
Natural resources	cu yds	10,421,250 cu yds	same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,273,320 cu yds to beneficial use
Water quality,quantity	Suspended sediment concentration & bedload	Possible indirect adverse impacts at certain locations resulting from current Corps policy	same as present	Possible indirect adverse impacts at certain locations resulting from modified Corps policy	No negligible change
Possible effects on industry	cu yds $	No change	same as present	Possible loss of market when dredged material is made availabe to beneficial users. 1,943,390 cu yds los $5,091,682 loss	1,943,390 cu yd loss $5,091,682 loss assuming all customers have previously purchased their sand from a private producer

RECOMMENDATION 4502

It is recommended that a legal review be initiated by the Chief of Engineers to determine what the Corps' liabilities are if dredged material is made available to either public or private entities, and such availability interferes with an existing market and distributor of sand.

DISPLAY OF RECOMMENDATION & PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4502

Pool Number

River Mile

Date Approved by Work Group

1. General problem addressed (write out & use number from Att. #1):

   5. Legal and policy information and analysis

2. Sub-problem addressed (write out - use only when necessary):

3. Sub-objective addressed (taken from Att. #2 - write out):

   Study the legal and institutional framework regarding placement of dredged material

4. Tasks accomplished to address problem (taken from Att. #3 - write out):

   Legal study

5. Listing of alternatives to problem:

   a. No legal review - wait until suit is brought against Corps

   b. Legal review

   c.

   d.

   e.

   f.

   g.

6. Selected alternative B (write in the letter)

7. **Rationale for selection of alternative:**

It is important to know early in the sand distribution process what can be don legally. If our methods are not proper we will have to reselect disposal site

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

DMUWG Legal and Institutional Study
Input from various sand and gravel producers

9. **Rationale for elimination of other alternatives:**

If we pass a plan and then find out that the plan faces many legal blockades, much time has been wasted.

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Legal processes defined in greater detail regarding disposal of dredged material for beneficial use.

Possible implementation delay caused by suit.

11. **Reason for work group rejection of recommendation:**

ATTACHMENT #7

RECOMMENDATION # 4502

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
Legal processes defined in greater detail regarding disposal of dredged material.	$	Unclear legal and institutional framework regarding placement of dredged material for beneficial use.	same as present	Clear understanding of legal and institutional framework regarding placement of dredged material for beneficial use.	$10,000
Possible implementation delay caused by suit.		Chance is minimal that suit will be brought against Corps since very little material is made available for beneficial use.	same as present	Possible implementation delay caused by suit.	Possible implementation delay caused by suit.
Business and industrial activity	$ cu yds	$2.50/cu yd historic disposal cost for 2,390,000 cu yds = $5,975,000	same as present	Possible increase in industrial activity making use of the less expensive resource cost= $13,238,000 value= $6,261,800 Benefits= -$6,976,200	 cost= $7,263,000 value= $6,261,800 Benefit= -$1,001,200
Dislacement of farms	acres	No impact	same as present	113.9 acres impacted	113.9 acres impacted
Natural resources	cu yds	10,421,250 cu yds	same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,272,320 cu yds to beneficial use

ATTACHMENT #7

RECOMMENDATION # 4502

LOCATION (RIVER MILE)

POOL

RECOMMENDATION

IMPACT

ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Water quality, quantity	Suspended sediment concentration & bedload	Possible indirect adverse impacts at certain locations resulting from current corps policy	same as present	Possible indirect adverse impacts at certain locations resulting from modified Corps policy	No negligible change

RECOMMENDATION 4503

Dredged material should be considered and promoted by the RID Corps, as a satisfactory fine aggregate source rather than a waste product.

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Attachment #4
DMUWG Work Group

DISPLAY OF RECOMMENDATION &
PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4503

Pool Number

River Mile

Date Approved by Work Group

1. General problem addressed (write out & use number from Att. #1):
   1. Describe constituents and properties of dredged material
   2. Determine productive uses for dredged material

2. Sub-problem addressed (write out - use only when necessary):

3. Sub-objective addressed (taken from Att. #2 - write out):
   Analyze and describe constituents and properties of dredged materials
   Determine productive uses for dredge material

4. Tasks accomplished to address problem (taken from Att. #3 - write out):
   Analyze and describe constituents and properties of dredged material
   Aggregate study

5. Listing of alternatives to problem:
   a. No change in present use of dredged material
   b. Dredged material considered as a fine aggregate source.
   c.
   d.
   e.
   f.
   g.

6. Selected alternative B (write in the letter)

7. **Rationale for selection of alternative:**

Market study has determined a great demand for dredged material

The Iowa State University study shows that the dredged material can be used as a satisfactory fine aggregate in portland cement concrete, asphaltic concrete, and mortar.

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

Waste Dredged Material for Construction - I.S.U. study DMUWG market study

9. **Rationale for elimination of other alternatives:**

A valuable resource is not being utilized to its fullest potential.

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Dredged material utilization.
Efficient use of resource
Local-regional cost savings on aggregate
Industrial activity
Possible effects on industry
New equipment requirements
Energy in transport
Reduced land disturbed for sand extraction
Reduced environmental impacts

11. **Reason for work group rejection of recommendation:**

RECOMMENDATION # 4503

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

ATTACHMENT #7

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Dredged material utilization	yds^3	Dredged material is considered a waste product and not a resource.	same as present	Dredged material is considered a resource and not a waste product.	14,880,000 cu yds available for possible productive use over 50 years.
Efficient use of resource	yds^3	Minimal use of dredged material	same as present	Major increase in use of dredged material 10,093,390 cu yds	+10,093,390 cu yds
Local-regional cost savings on aggregate	$/$yds^3$	current market value paid for extracted aggregate	same as present	Material made available free of charge	$5,091,682 assuming all concerned entities have previously purchased sand from a private producer
Possible effects on industry	$/cu yds	no change	same as present	Possible loss of market when dredged material is made available to beneficial users 1,943,390 cu yds loss $ 5,091,682 loss	3,943,390 cu yds, loss $10,331,682 loss assuming all customers previously purchased sand from a private producer

RECOMMENDATION #4503

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

ATTACHMENT #7

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
New equipment requirements	$	Standard equipment used. One mile transport distance.	same as present	Equipment needed to transport material to beneficial use sites. Up to three mile transport distance. To reach most sites one extra booster required $4,000/day/booster with 1500 days of dredging for 50 yrs.	$6,000,000 for one additional booster
Energy in transport	gallons	Minimal energy consumption used in one mile transport distance	same as present	Increased energy consumption used in three mile transport distance	Average of 1,488,000 gals. increase
Reduced land disturbed for sand extraction	acres	Increasing landarea disturbed for sand extraction. 523 acres lost	same as present	Reduced land disturbed for sand extraction replaced by dredged material. 523 acres saved	523 acres saved by industry and local interest.

ATTACHMENT #7

RECOMMENDATION # 4503

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5–COL. 4)
Reduced environmental impacts	acres	No change	same as present Acreages Impacted Open Water 1410 Deep Marshes 8.3 Terrestrial 20 Woody veg. 116.4 Developed 18.4 Dredged Material 267.4	Transport dredged material normally placed at environmentally adverse disposal sites to beneficial use disposal sites. Acreages Impacted Open Water 266.4 Deep Marshes 4.5 Terrestrial veg. 10.7 Woody veg. 144. Agric. 113.9 Developed 152 Dredged Material 117.7	Net Acreages Impacted Open water -1143.6 Deep Marshes 3.8 Terrestrial -9.3 Woody veg. 27.6 Agric. 113.9 Developed 133.6 Dredged Material -149.7
Business and industrial activity	$/cu yds	$2.50/cu yd historic disposal cost for 2,390,000 cu yds =$5,975,000	same as present	Possible increase in industrial activity making use of this less expensive resource cost= $13,238,000 value=$6,261,800 benefits= -$6,976,200	cost = $7,263,000 value = $6,261,800 benefits= -$1,001,200

RECOMMENDATION # 4503

LOCATION (RIVER MILE)

POOL

RECOMMENDATION

IMPACT

ASSESSMENT FORM

ATTACHMENT #7

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Displacement of farms	acres	No impact	same as present	113.9 acres impacted	113.9 acres impacted
Natural resources	cu yds	10,421,250 cu yds	same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,273,320 cu yds to beneficial use
ater quality. quantity	Suspended sediment concentration & bedload	Possible indirect adverse impacts at certain locations resulting from current Corps policy	same as present	Possible indirect adverse impacts at certain locations resulting from modified Corps policy	No negligible change.

RECOMMENDATION 4504

It is recommended that dredged material be disposed of in such a manner that it is available to the people, organizations, and agencies that have requested it through the DMUWG Market Study.

June 26, 1979

Attachment #4
DMUWG Work Group

DISPLAY OF RECOMMENDATION & PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4504

Pool Number

River Mile

Date Approved by Work Group

1. **General problem addressed (write out & use number from Att. #1):**

   3. Total river demand for dredged material is not known
   6. Determine market demand for dredged material

2. **Sub-problem addressed (write out - use only when necessary):**

   Productive Uses: New and productive uses for dredged material may cut into existing markets. Delivery time for dredged material is unpredictable.

3. **Sub-objective addressed (taken from Att. #2 - write out):**

   Determine needs for dredged material
   Conduct a study of sand and gravel producers and quarry operators

4. **Tasks accomplished to address problem (taken from Att. #3 - write out):**

   Market Study

5. **Listing of alternatives to problem:**

   a. Material disposed of as in past.

   b. Material disposed of in such a manner that it is available to the people, organizations, and agencies that have requested material through the DMUWG market study (see attached market study guidelines).

   c.

   d.

   e.

   f.

   g.

6. **Selected alternative** B **(write in the letter)**

7. **Rationale for selection of alternative:**

The Iowa State University Study shows that the dredged material is a resource and not a waste product.
Market study has determined a great demand for dredged material.

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

Waste Dredged Material for Construction - I.S.U. study.
DMUWG market study

9. **Rationale for elimination of other alternatives:**

A valuable resource is not being utilized to its fullest potential.

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Increased beneficial use
Increased disposal cost for Corps
User may pay for material if transported beyond long term sites
Corps policy change required
Possible effects on industry
Possible less use of historic sties
Possible reduced environmental impact by promoting use of beneficial use sites

11. **Reason for work group rejection of recommendation:**

MARKET STUDY DISPOSAL GUIDELINES

(Recommendation 4504)

Dredge Cut	Productive Use Request	Miles Willing to Travel	Recommended Disposal Site
Pool 11			
595.5-596.5	Dubuque Co, IA	5	D9
	Sherrill, IA	5	D9
598-599	Dubuque Co, IA	5	D8
	Grant Co, Wis.	20	D24, D28, D29
	Tennyson, Wis.	3	D24
	Kowalski-Kieler, Inc.	30	D24, D28, D29
609-610	Grant Co, Wis.	20	D28, D29, D32
	Kowalski-Kieler, Inc.	30	D28, D29, D32
610-612.3	Grant Co, Wis.	20	D28, D29
	Kowalski-Kieler, Inc.	30	D28, D29
612.3-613	Grant Co, Wis.	20	D28, D29, D30
	Kowalski-Kieler, Inc.	30	D28, D29, D30
Pool 12			
565-566	Bellevue Sand & Gravel	5 - 8	D17, 18
	Dubuque Sand & Gravel	5	TF579.5
Pool 13			
525-525.5	Determans Blacktop Inc.		TF512.5 (pool 14)
531-532	Spring Lake Wildlife Levee		2D9, TF3
	Determans Blacktop Inc.		TF512.5 (pool 14)
532.5-533.5	Spring Lake Wildlife Levee		2D9, TF3, TF533.8, TF534
	Savanna, Ill	5	537L
	Jackson Co, IA	30	D32
538.8-539.8	Savanna, Ill	5	537L, D56
	Jackson Co, IA	30	D31
540.5-541	Savanna, Ill	5	D55, D56
	Jackson Co, IA	30	D31
544-545	Savanna, Ill	5	D54, D55
	Green Island Levee		HD6, 26
	Green Island Levee Ext.		TF4
546-547.5	Jackson Co, IA	30	D4, D21, D26
	Bellevue, IA	10	D4
	Green Island Levee		where needed
	Green Island Levee Ext		TF4

Pool 13 (continued)

547.5-548.8	Jackson Co, IA	30	D4, D15, D16, D21
	Bellevue, IA	10	D4, D15, D16
	Bellevue Sand & Gravel	5 - 8	D17, 18 (pool 12)
	Green Island Levee		where needed
549.8-550.8	Jackson Co, IA	30	D4, D5, D6, D7
	Bellevue, IA	10	D4, D5, D6, D7
	Bellevue Sand & Gravel	5 - 8	D17, 18 (pool 12)
	Green Island Levee		where needed
552.5-553	Jackson Co, IA	30	D1, D3, D4
	Bellevue, IA	10	D1, D3, D4
	Bellevue Sand & Gravel	5 - 8	D17, 18 (pool 12)

Pool 14

493.5-494.8	LeClaire, IA	5 - 10	D2
	Scott Co, IA	15	D2
	Port Bryon, Ill	15	D59, 2D6
	Rock Island Co, Ill	12	D59, 2D6
	LeClaire Quarries		D4
503.2-504	Cordova, Ill		D50, D53
	Rock Island Co, Ill	12	D50, D53
	Scott Co, IA	15	D5, D8
	Princeton Wildlife Levee		where needed
	Determans Blacktop, Inc.		TF512.5
	Moline Consumers		D41'
	Cordova Quarry, Inc.		D56
505.5-506	Cordova, Ill		D47, D50
	Rock Island Co, Ill	12	D47, D50
	Princeton Wildlife Levee		where needed
	Scott Co, IA	15	D9
508.5-509	Cordova, Ill		D41, D42, D43
	Rock Island Co, Ill	12	D41, D42, D43
	Moline Consumers		D41'
513-514	Determans Blacktop, Inc.		TF512.5
	Moline Consumers		D41'
	W.G. Block Co.	10	D22'
516-517	Determans Blacktop, Inc.		TF512.5
	Moline Consumers		D41'
518.5-519.5	Determans Blacktop, Inc.		TF512.5
	Moline Consumers		D41'
	Quality Ready Mix		PP1
513.5-517.5	Clinton, IA	5	D23
	Determans Blacktop, Inc.		TF512.5
	W.G. Block Co.		D22'
516 -517.8	Determans Blacktop, Inc.		TF512.5
	Moline Consumers		D41'

Pool 15

489.5-489.8	John Deere & Co.		D16A
	Moline Consumers		D10
	Scott Co, IA	15	D11
	W.G. Block and/or Builders Sand & Gravel		TF483.2
490.8-491.8	Scott Co, IA	15	D3
	Rock Island, Ill	10	D15
	Rock Island Co, Ill	12	D15
	John Deere & Co		D16A
	Moline Consumers		D10
	W.G. Block Co. and/or Builders Sand & Gravel		TF483.2

Pool 16

461-462	Rock Island Co, Ill.	10	TF1
	Muscatine Co, IA	10	D12, 2D6, TF468
469.2-471.2	Scott Co, IA	15	D25, D28, D31
	Muscatine, IA	10	D22, TF468
472-473.2	Scott Co, IA	15	D28, D31, D37
	Andalusia, Ill	5	D33
	Illinois City, Ill	20	D33
	Rock Island Co, Ill	12	D33
481.3-482	Scott Co, IA	15	D60, D61
	Rock Island Co, Ill	12	TF2
482.3-482.8	Scott Co, IA	15	D60
	Rock Island Co, Ill	12	TF2

Pool 17

447.5-448.5	Rock Island Co, Ill	12	TF450
	Illinois City, Ill	20	TF450
	Muscatine Co, IA	10	D3, D4
	Louisa Co, IA	25	D5 C & D
	W.G. Block Co.	10	TF451.2
	Monsanto		TF449.9
	Muscatine-Louisa Co. Drain. Dist. #13		Levee
451.5-452	Rock Island Co, Ill	12	D17
	Illinois City, Ill.	20	D17
	Muscatine Co, IA	10	D3, TF452.5
	W.G. Block Co.	10	TF451.2
	Acme Sand & Gravel Co.		D1A, D2
453.2-454.5	Rock Island Co, Ill	12	D2,D12A,B,C,D13A,B,C,D,D17, TF455
	Illinois City, Ill	20	D2,D12A,B,C,D13A,B,C,D,D17, TF455
	Muscatine Co, IA	10	TF452.5
	W.G. Block Co.	10	TF451.2

Pool 18

411-417	Des Moines Co, IA	10	D13
	Burlington, IA	5	D13
	Henderson Co, Ill	10+	D23
	Oquawka, Ill	20	D23
	Gladstone, Ill	10	D23
	Des Moines Co. Drain. Dist. #7		
	Henderson Co. Drain. Dist. #3		Both Levees
418.5-420	Des Moines Co, IA	10	D9, TF420.5, TF418.2
	Mercer Co, Ill		HD9+
	Keithsburg, Ill	2	HD9+
	Des Moines Co, Drain. Dist #7		Iowa Levee
	Oquawka, Ill	10+	TF415.6
424.2-424.5	Des Moines Co, IA	10	D7
	Henderson Co, Ill	10+	D18
	Oquawka, Ill	20	D18
	Mercer Co, Ill		D17, 3D2, HD9+
	Keithsburg, Ill	2	HD9+
425.5-426.5	Louisa Co, IA	25	D6
	Mercer Co, Ill		D17, HD9+
	Keithsburg, Ill	2	D17, HD9+
	Lake Odessa Wildlife Levee		TF435
	Louisa-Des Moines Co. Drain Dist. #4		Iowa Levee
431-432	Louisa Co, IA	25	TF433, D4
	Mercer Co, Ill		HD11'
	Lake Odessa Wildlife Levee		TF435
433-434	Louisa Co, IA	25	TF433, D4
	Lake Odessa Wildlife Levee		TF435
	Louisa-Des Moines Co. Drain. Dist. #4		
	Iowa River-Flint Creek Levee Dist. #16		
	Bay Island Drain. & Levee Dist. #1		Both Levees

Pool 19

394.2-394.8	Lee Co, IA		D7A,B, TF394
	Iowa Southern Utility		D6
	Roth		D5"
			TF398.3
	Green Bay Levee & Drain. Dist. #2		Behind Green Bay Levee
398.2-399.2	Des Moines Co, IA	10	TF398
	Burlington, IA	5	TF398
	Iowa Southern Utility		D6
			D5'
	Roth		D5"
	Raid Quarries		D6'
	Henderson Co, Ill	10+	D30
399.2-399.6	Des Moines Co, IA	10	TF398, D4
	Burlington, IA	5	TF398, D4
	Iowa Southern Utility		D6
			D5'
	Roth		D5"
	Raid Quarries		D6'
399.6-400.6	Des Moines Co, IA	10	TF398, D4
	Burlington, IA	5	TF398, D4
	Henderson Co, Ill	10+	D30
	Oquawka, Ill	20	D30
	Cascade Boat Club		HD6
	Iowa Southern Utility		D6
			D5'
	Roth		D5"
	Raid Quarries		D6'
	Cascade Boat Club		Cascade Boat Club
404.2-404.5	Des Moines Co, IA	10	D2,D3,TF398,TF404.5,TF404.8
	Burlington, IA	5	D2,D3,TF398,TF404.5,TF404.8
	Henderson Co, Ill	10+	D31, D32, D32'
405-406	Des Moines Co, IA	10	D2,D3,TF404.5,TF404.8
	Burlington, IA	5	D2,D3,TF404.5, TF404.8
	Henderson Co, Ill	10+	D31, D32, D32'
406-407	Des Moines Co, IA	10	D2,D3,TF404.5,TF404.8,TF408
	Burlington, IA	5	D2,D3,TF404.5,TF404.8,TF408
	Henderson Co, Ill	10+	D31, D32, D33, HD17',D32'
	Gladstone, Ill	10	D33, HD17'
	Oquawka, Ill	20	D33, HD17'
407-408	Des Moines Co, IA	10	D1B,D2,TF408,TF404.8
	Burlington, IA	5	D1B,D2,TF408,TF404.8
	Henderson Co, Ill	10+	D33, D34, HD17'
	Gladstone, Ill	10	D33, D34, HD17'
	Oquawka, Ill	20	D33, D34, HD17'

Pool 20

343.3-344	Lewis Co, Mo	15	D10
	Gregory Drainage Dist.		Levee
	Lima Lake Drain. Dist.		Levee
344.8-345.3	Lewis Co, Mo	15	D8', D10, TF347.7
	Gregory Drainage Dist.		Levee
	Lima Lake Drain. Dist.		Levee
348.8-349.6	Lewis Co, Mo	15	D7,D8,TF347.7,HD7,D8'
	Hancock Co, Ill.	15	D19,D20,D21,TF349,TF351
	Gregory Drainage Dist.		Levee
	Hunt Drainage Dist.		Levee
351-352	Lewis Co, MO	15	D7
	Hancock Co, Ill	15	D19, TF349, TF351
	Clark Co, Mo	15	D6, HD12
	Gregory Drainage Dist.		Levee
	Hunt Drainage Dist.		Levee
354-356	Hancock Co, Ill	15	D15',TF355,D13,D17,D14
	Clark Co, Mo	15	D4, D6, TF355
	Lee Co, IA		TF362
	Keokuk, IA	15	TF362
361-361.6	Hancock Co, Ill	15	D12
	Clark Co, Mo	15	D1
	Lee Co, IA		D23, TF361.5, TF362
	Keokuk, IA	15	D23, TF361.5, TF362
361.9-362.6	Hancock Co, Ill	15	D11, D12
	Clark Co, Mo	15	D1
	Lee Co, IA		D23, TF361.5, TF362
	Keokuk, IA	15	D23, TF361.5, TF362

Pool 21

327.1-327.6	Quincy, Ill	5	TF326.1
330.5-331.5	Quincy, Ill	5	TF326.1
	Lewis Co, Mo	15	D11B, D10, TF332, D12
331.5-332.6	Quincy, Ill	5	TF326.1
	Lewis Co, Mo	15	D10, D11B, TF332, D12
332.6-333.6	Quincy, Ill	5	TF326.1
	Lewis Co, Mo	15	D11B, TF332, D12
335.5-336.5	Quincy, Ill	5	TF326.1
	Lewis Co, Mo	15	HD11, D13, D14, D12, D15
	LaGrange, Mo		HD11, TF336.6, TF335
337 -338	Quincy, Ill	5	RF326.1
	Lewis Co., Mo.	15	HD11
	La Grange, Mo.		HD11, TF336.6

Pool 21 (continued)

338.8-339.8	Lewis Co, Mo	15	TF339.5, TF341.5, D16, D15
	Qunicy, Ill	5	TF326.1
342-343	Lewis Co, Mo	15	TF341.5, TF342.9, D17

Pool 22

300.3-300.4	Pike Co, Ill	25	Behind Ill Levee
	Hull, Ill	5-10	Behind Ill Levee
302-303.5	Pike Co, Ill	25	D8
	Hull, Ill	5-10	D8
311.2-312.2	Pike Co, Ill	25	D5, D4
	Hull, Ill	5-10	D5, D4
	Marion Co, Mo	10	TF310.7, HD320.5
	McIntyre & Sons		TF310.7
312.6-314.3	Marion Co, Mo	10	HD320.5
	Palmyra, Mo	8	D11
315.8-316.8	Marion Co, Mo	10	HD320.5
	Palmyra, Mo	8	D12, D13
319.5-320.5	Marion Co, Mo	10	HD320.5,D14',D15
323.5-324.7	Marion Co, Mo	10	TF324, D16
	Quincy, Ill	5	D1, TF324.6

ATTACHMENT #7

RECOMMENDATION # 4504

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Corps policy change required.		Usually the least expensive, environmentally suitable disposal site is used with minimal material made available for beneficial use.	Same as present +$10,386,000 net benefit, but environmental degredation continues.	Planform approved sites should be used for disposal unless a state requires on-land disposal at other than Planform sites. $21,350,000 net cost but reduced environmental degredation.	An adjusted net cost of $31,236,000. Reduced environmental degradation. 1232.5 sensitive environmental acres not disposed on.
Possible less use of historic sites	acres	Majority of sites used for disposal are historic sites	Same as present	Reduction in the use of historic sites.	Little used (by recreationists) sites will not be maintained. 149.7 acres less will be used
Possible reduced environmental impacts by promoting use of beneficial use sites.	acres	No change	Same as present Acreages Impacted Open Water 1410 Deep Marshes 8.3 Terrestrail 20 Woody veg. 116.4 Developed 18.4 Dredged Material 267.4	Transport dredged material normally placed at environmentally adverse disposal sites to beneficial use disposal sites Acreages Impacted Open Water 266.1 Deep Marshes 4.5 Terrestrial 10.7 Woody Veg. 144. Agric. 113.9 Developed 152 Dredged Materail 117.7	Net Acreages Impacted Open Water -1143.6 Deep Marshes 3.8 Terrestrial -9.3 Woody veg. 27.6 Agric. 113.9 Developed 133.6 Dredged Material -149.7

ATTACHMENT #7

RECOMMENDATION # 4504

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Increased beneficial use.	$	Very few disposal sites have been used in such a manner that the material could be made available for a beneficial use. Recreation use only.	Same as present. $30,386,000 Recreation beneficial use.	Many disposal sites would be used in such a manner that material could be made available for a beneficial use. $38,529,000 beneficial use value.	+$8,143,000
Increased disposal cost for Corps.	$	Usually the least expensive, environmentally suitable disposal site is used with minimal material made available for beneficial use. $20,000,000	same as present $20,000,000	Possible increased disposal costs to the Corps in using disposal sites that make material available for beneficial use. $59,879,000	-$39,879,000
User may pay for material if transported beyond long term sites.	$	If requested dredged material is transported beyond a normal distance the requester must pay the extra transport cost.	same as present	If requested dredged material is transported beyond a normal distance to a plan form approved site-the requester should not have to pay extra transport distance.	On a case by case basis users may have to pay for extra transport of material.

ATTACHMENT #7

RECOMMENDATION # 4504

LOCATION (RIVER MILE) _____

POOL _____

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
Business and Industrial activity	$cu/yds	$2.50/cu yd historic disposal cost for 2,390,000 cu yds = $5,975,000	Same as present	Possible increase in industrial activity making use of this less expensive resources cost= $13,238,000 value= $6,261,800 benefits= -$6,976,200	cost= $7,263.000 value= $6,261,800 benefits = -$1,001,200
Displacement of farms	acres	No impact	Same as present	113.9 acres impacted	113.9 acres impacted
Natural resources	cu yds	10,421,250 cu yds	Same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,273,320 cu yds to beneficial use
Water quality, quantity	Suspended sediment concentration & bedload	Possible indirect adverse impacts at certain locations resulting from current Corps policy	Same as present	Possible indirect adverse impacts at certain locations resulting from modified Corps policy	No negligible change
Possible effects on industry	cu yds $	No change	Same as present	Possible loss of market when dredged material is made available to beneficial users. 1,943,390 cu yds loss $5,091,682 loss	1,943,390 cu yd loss $5,091,682 loss assuming all customers have previously purchased their sand from a private producer

RECOMMENDATION 4505

It is recommended that where feasible beneficial use sites recommended by the DMUWG be utilized for dredged material disposal during normal channel maintenance dredging. It is necessary that the sites be justified based upon economic and environmental considerations. If transport beyond an environmentally acceptable site is required, beneficial use values derived from the action should be great enough to offset the extra cost of transport.

June 26, 1979
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Attachment #4
DMUWG Work Group

DISPLAY OF RECOMMENDATION & PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4505

Pool Number _____

River Mile _____

Date Approved by Work Group _____

1. General problem addressed (write out & use number from Att. #1):

   4. Very few disposal sites have been used or selected in such a manner that the material could be made available for a productive use.

2. Sub-problem addressed (write out - use only when necessary):

3. Sub-objective addressed (taken from Att. #2 - write out):

   Selection of sites for dredged material disposal.

4. Tasks accomplished to address problem (taken from Att. #3 - write out):

   Preliminary disposal site selection
   Final disposal site selection

5. Listing of alternatives to problem:

   a. Utilize historic disposal sites

   b. Utilize beneficial use sites recommended by the DMUWG (see attached guidelines sheet)

   c. Utilize only the DMUWG beneficial use sites that have been approved by the Plan Formulation Work Group.

   d.

   e.

   f.

   g.

6. Selected alternative B (write in the letter)

7. **Rationale for selection of alternative:**

The Iowa State University Study shows that the dredged material is a resource and not a waste product.
Market study has determined a great demand for dredged material.

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

Waste Dredged Material for Construction - I.S.U. study.
DMUWG market study

9. **Rationale for elimination of other alternatives:**

A valuable resource is not being utilized to its fullest potential. (A)
Equipment limitations (B)

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Increased beneficial use
Dredged material utilization
Efficient use of resource
Local-regional cost savings on aggregate
Increased disposal cost for Corps
User may pay for material if transported beyond long term sites
Corps policy change required
Possible effects on industry
Possible less use of historic sites
Possible reduced environmental impact by promoting use of beneficial use sites
Reduced land distrubed for sand extraction
New equipment requirements
Energy in transport

11. **Reason for work group rejection of recommendation:**

DMUWG ALTERNATIVE BENEFICIAL USE SITES

(Recommendation 4505)

Pool 11

595.5 - 596.5	H - HD 1 FP - D 9 RFFP - D 9
598 - 599	H - HD 1, HD 2 FP - D 5, D 8, D 28 RFFP - D 8, D 24, D 29
609 - 610	H - HD 7, HD 8 FP - D 5, D 28, D 32 RFFP - D 28, D 29
610 - 612.3	H - HD 7, HD 8, HD 9 FP - D 4, D 5, D 28 RFFP - D 2, D 3, D 28, D 29
612.3 - 613	H - HD 9, HD 11 FP - D 4, TF 1, D 28 RFFP - D 2, D 3, TF 1, D 28, D 29, D 30

Pool 12

565 - 566	H - HD 2 FP - D 36 RFFP - D 17-18, TF 579.5

Pool 13

525 - 525.5	H - TF 1 FP - D 46 RFFP - TF 512.5 (Pool 14)
531 - 532	H - HD 531.4 FP - 2 D 9, TF 3, D 65 RFFP - TF 512.5 (Pool 14)
532.5 - 533.5	H - HD 17-18 FP - 2 D 9, TF 3, TF 533.8, TF 534 RFFP - D 32, TF 537 L
538.8 - 539.8	H - None FP - D 56 RFFP - D 31, TF 537 L
540.5 - 541	H - HD 20 FP - D 56 RFFP - D 31, D 55

544 - 545	H - HD 5, HD 6-26 FP - D 54, TF 4 RFFP - D 55
546 - 547.5	H - Green Island Levee FP - D 4, D 21, TF 4 RFFP - D 26
547.5 - 548.8	H - Green Island Levee FP - D 4, D 15, D 16, D 21 RFFP - D 17-18 (Pool 12)
549.8 - 550.8	H - HD 13 FP - D 4, Green Island Levee RFFP - D 5, D 6, D 7, D 17-18 (Pool 12)
552.5 - 553	H - HD 554.6 FP - D 3, D 4 RFFP - D 1, D 17-18 (Pool 12)

Pool 14

493.5 - 494.8	H - None FP - D 2, D 59 RFFP - D 4, 2 D 6
503.2 - 504	H - HD 4, HD 5, HD 6, HD 7 FP - D 5, D 41', TF 512.5, Princeton Wildlife Levee RFFP - D 8, D 50, D 53, D 56
505.5 - 506	H - HD 7 FP - D 9, Princeton Wildlife Levee RFFP - D 47, D 50
508.5 - 509	H - HD 9-10 FP - D 41, D 41' RFFP - D 42, D 43
513 - 514	H - None FP - D 36, D 22', D 41', TF 512.5 RFFP - None
516 - 517	H - None FP - None RFFP - D 41', TF 512.5
517 - 517.8	H - None FP - None RFFP - D 41', TF 512.5
518.5 - 519.5	H - TF 519.5 FP - PP 1 RFFP - D 41', TF 512.5

513.5 - 517.5	H - None FP - D 23, D 22' RFFP - TF 512.5

Pool 15

489.2 - 489.8	H - HD 3 FP - D 11, D 16A RFFP - D 10, TF 483.2
490.8 - 491.8	H - HD 1, HD 3 FP - D 3, D 16A RFFP - D 10, TF 483.2

Pool 16

461 - 462	H - HD 1 FP - D 12, TF 1 RFFP - 2 D 6, TF 468
469.2 - 471.2	H - HD 3 FP - D 22, D 25, D 28, D 31/HD 4 RFFP - D 25, D 28, TF 468
472 - 473.2	H - HD 4, HD 5 FP - D 28, D 31, D 33 RFFP - D 37
481.3 - 482	H - None FP - None RFFP - D 60, D 61, TF 2
482.3 - 482.8	H - None FP - None RFFP - D 60, TF 2

Pool 17

447.5 - 448.5	H - HD 3, HD 4 FP - TF 449.9, TF 450, TF 451.2, Muscatine-Louisa Co., Drainage Dist. # 13 RFFP - D 3, D 4, D 5 C+D, TF 451.2
451.2 - 452	H - None FP - TF 451.2 RFFP - D 1A, D 2, D 3, D 17, TF 451.2, TF 452.5
453.2 - 454.5	H - HD 8 FP - D 12A, D 13 B, C, TF 455 RFFP - D 2, D 17, D 13 A, D, D 12, B, C, TF 451.2, TF 452.5

Pool 18

411 - 412	H - None FP - D 23, Des Moines Co. Drainage Dist. # 7, Henderson Co. Drainage Dist. # 3 RFFP - D 13, Des Moines Co. Drainage Dist. # 7, Henderson Co. Drainage Dist. # 3
418.5 - 420	H - HD 3 FP - TF 415.6, Des Moines Co. Drainage Dist. # 7 RFFP - D 9, HD 9+, TF 415.6, TF 418.2, TF 420.5
424.2 - 424.5	H - HD 7 FP - D 17, D 18, 3 D 2 RFFP - D 7, HD 9+
425.5 - 426.5	H - HD 8, HD 10 FP - D 17, HD 9+, Louisa-Des Moines Co. Drainage Dist. # 4 RFFP - D 6, HD 9+, TF 435
431 - 432	H - HD 11' FP - HD 11', TF 433 RFFP - D 4, TF 433, TF 435
433 - 434	H - HD 434 FP - TF 433, Louisa-Des Moines Co. Drainage Dist. # 4, Iowa River--Flint Creek Levee Dist. # 16, Bay Island Drainage and Levee Dist. # 1. RFFP - D 4, TF 435

Pool 19

394.2 - 394.8	H - HD 394 FP - Create recreation island, D 6, TF 394 RFFP - D 5", Green Bay Levee and Drainage Dist. # 2
398.2 - 399.2	H - HD 2 FP - D 6, D 6', TF 398 RFFP - D 5', D 5", D 30
399.2 - 399.6	H - HD 2, HD 3 FP - D 6, D 6', TF 398 RFFP - D 4, D 5', D 5"
399.6 - 400.6	H - HD 2, HD 3, HD 4 FP - D 3, D 6, D 6', TF 398, Cascade Boat Club RFFP - D 4, D 5', D5"
404.2 - 404.5	H - HD 8, HD 9, HD 13 FP - D 3, TF 398, TF 404.5, TF 404.8 RFFP - D 2, D 31, D 32

405 - 406	H - HD 8, HD 9, HD 13, HD 14 FP - D 3, D 32', TF 404.5, TF 404.8 RFFP - D 2, D 31, D 32
406 - 407	H - HD 9, HD 13, HD 14 FP - D 3, D 32', TF 404.5, TF 404.8 RFFP - D 2, D 31, D 32, D 33, TF 408
407 - 408	H - Mercer Island FP - TF 404.8 RFFP - D 1 B, D 2, D 33, D 34, TF 408

Pool 20

343.3 - 344	H - None FP - Gregory Drainage Dist., Lima Lake Drainage Dist. RFFP - D 10
344.8 - 345.3	H - None FP - TF 347.7, Gregory Drainage Dist., Lima Lake Drainage Dist. RFFP - D 8', D 10
348.8 - 349.6	H - HD 7 FP - TF 347.7, TF 349, TF 351 RFFP - D 7, D 8, D 8', D 19, D 20, D 21, Gregory Drainage Dist., Hunt Drainage Dist.
351 - 352	H - HD 12 FP - TF 349, TF 351 RFFP - D 7, D 6, D 19, Gregory Drainage Dist., Hunt Drainage Dist.
354 - 356	H - HD 8, HD 9 FP - D 4, TF 355 RFFP - D 6, D 13, D 14, D 15', D 17, TF 362
361 - 361.6	H - None FP - D 1, D 23, TF 361.5 RFFP - D 12, TF 362
361.9 - 362.6	H - None FP - D 1, D 11, D 23, TF 361.5 RFFP - D 12, TF 362

Pool 21

327.1 - 327.6	H - HD 2 FP - D 7 RFFP - TF 326.1
330.5 - 331.5	H - HD 5, HD 6 FP - D 7, TF 332, TF 332.3, TF 333 RFFP - D 10, TF 326.1, D 11 B, D 12

331.5 - 332.6	H - HD 5, HD 6 FP - D 7, TF 332, TF 332.3, TF 333 RFFP - D 10, TF 326.1, D 11 B, D 12
332.6 - 333.6	H - HD 6 FP - D 7, TF 332, TF 332.3, TF 333 RFFP - D 11 B, D 12
335.5 - 336.5	H - HD 11 FP - D 13, D 14, TF 335, TF 336.6 RFFP - D 12, D 15, TF 326.1
337 - 338	H - HD 11 FP - D 13, D 14, TF 336.6 RFFP - D 12, D 15, TF 326.1
338.8 - 339.8	H - None FP - D 16, TF 339.5 RFFP - D 15, TF 341.5, TF 326.1
342 - 343	H - None FP - D 17, TF 342.9 RFFP - TF 341.5

Pool 22

300.3 - 300.4	H - None FP - None RFFP - Sny Island Levee Drainage Dist.
302 - 303.5	H - None FP - None RFFP - D 8
311.2 - 312.2	H - HD 320.5 FP - TF 310.7 RFFP - D 4, D 5
312.6 - 314.3	H - HD 320.5 FP - None RFFP - D 11
315.8 - 316.8	H - HD 10, HD 320.5 FP - None RFFP - D 12, D 13
319.5 - 320.5	H - HD 320.5 FP - HD 320.5 RFFP - D 14', D 15
323.5 - 324.7	H - None FP - TF 324.6 RFFP - D 1, D 16, TF 324

ATTACHMENT #7

RECOMMENDATION #4505

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
User may pay for material if transported beyond long term sites.	$	If requested dredged material is transported beyond a normal distance the requester must pay the extra transport cost.	Same as present	If requested dredged material is transported beyond a normal distance to a Planform approved site-the requester should not have to pay extra transport distance.	On a case by case basis users may have to pay for extra transport of material
Corps policy change required.		Usually the least expensive, environmentally suitable disposal site is used with minimal material made available for beneficial use.	Same as present +$10,386,000 net benefit, but environmental degradation continues.	Planform approved sites should be used for disposal unless a state requires on-land disposal at other than Planform sites. $21,350,000 net cost but reduced environmental degradation.	An adjusted net cost of $31,736,000. Reduced environmental degradation. 1232.5 sensitive environmental acres not disposed on.
Possible less use of historic sites	acres	Majority of sites used for disposal are historic sites.	Same as present	Reduction in the use of historic sites.	Little used (by recreationists) sites will not be maintained 149.7 acres less will be used.

ATTACHMENT #7

RECOMMENDATION # 4505

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
Increased beneficial use.	$	Very few disposal sites have been used in such a manner that the material could be made available for a beneficial use. Recreation use only.	Same as present. $30,386,000 Recreation beneficial use.	Many disposal sites would be used in such a manner that material could be made available for a beneficial use. $38,529,000 beneficial use value.	+$8,143,000
Dredged material utilization.	yds^3	Dredged material is considered a waste product and not a resource.	Same as present	Dredged material is considered a resource and not a waste product.	11,880,000 cu y available for possible productive use over 50 years.
Efficient use of resource.	yds^3	Minimal use of dredged material	Same as present	Major increase in use of dredged material 10,093,390 cu yds.	+10,093,390 cu yds
Local-regional cost savings on aggregate	$/yds^3$	Current market value paid for extracted aggregate	Same as present	Material made available free of charge	+$5,091,682 assuming on all concerned entitied have previously purchased their sand from a private producer.
Increased disposal cost for Corps	$	Usually the least expensive, environmentally suitable disposal site is used with minimal material made available for beneficial use. $20,000,000	Same as present $20,000,000	Possible increased disposal costs to Corps in using disposal sites that make material available for beneficial use. $59,879,000	-$39,879,000

ATTACHMENT #7

RECOMMENDATION # 4505

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Energy in transport	$	Minimal energy consumption used in one mile transport distance.	Same as present	Increased energy consumption used in three mile transport distance.	Average of 1,488,000 gals. increase.
Possible effects on industry.	cu yds/$	No change	Same as present	Possible loss of market when dredged material is made available to beneficial users. 1,943,390 cu yds $5,091,682 loss	1,943,390 cu yd loss $5,091,682 loss assuming all customers have previously purchased their sand from a private producer.
Business and Industrial activity	$/cu yds	$2.50/cu yd historic disposal cost for 2,390,000 cu yds = $5,975,000	Same as present	Possible increase in industrial activity making use of this less expensive resource . cost= $13,238,000 value=$6,261,800 benefits=-$6,976,200	cost=$7,263,000 value= $6,261,800 benefits= -$1,001,200
Displacement of farms	acres	No impact	Same as present	113.9 acres impacted	113.9 acres impacted
Natural resources	cu yds	10,421,250 cu yds	Same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,273,320 cu yds to beneficial use

ATTACHMENT #7

RECOMMENDATION #4505

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL.5-COL.4)
Possible reduced environmental impacts by promoting use of beneficial use sites.	acres	No change	Same as present Acreages Impacted Open Water 1410 Deep Marshes 8.3 Terrestrial 20 Woody veg. 116.4 Developed 18.4 Dredged Material 267.4	Transport dredged material normally placed at environmentally adverse disposal sites to beneficial use disposal sites. Acreages Impacted Open Water 266.4 Deep Marshes 4.5 Terrestrial Veg. 10.7 Woody Veg. 144. Agric. 113.9 Developed 152 Dredged Material 117.7	Net Acreaged Impacted Open Water -1143.6 Deep Marshes -3.8 Terrestrail -9.3 Woody Veg. 27.6 Agric. 113.9 Developed 133.6 Dredged Material -149.7
Reduced land disturbed for sand extraction.	Acres	Increasing land area disturbed for sand extraction. 523 acres lost.	Same as present	Reduced land disturbed for sand extraction replaced by dredged material. 523 acres saved.	523 acres saved
New equipment requirements.	gallons	Standard equipment used. One mile transport distance.	Same as present.	Equipment needed to transport material to beneficial use sites. Up to three mile transport distance to reach most sites one extra booster is required. $4000/day/booster with 150 days of dredging for 50 years.	$6,000,000 for one additional booster.

ATTACHMENT #7

RECOMMENDATION # 4505

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
Water Quality, quantity	Suspended sediment concentration & bedload.	Possible indirect adverse impacts at certain locations resulting from current Corps policy.	Same as present	Possible indirect adverse impacts at certain locations resulting from modified Corps policy.	No negligible change

RECOMMENDATION 4506

Open water disposal should not be considered when market study identified productive use sites are within the reach of equipment. Beneficial use values derived from the action must be great enough to offset the extra cost of transport and containment and it must be shown that environmental impacts can be significantly reduced by using the productive use site.

June 26, 1979
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Attachment #4
DMUWG Work Group

DISPLAY OF RECOMMENDATION & PRELIMINARY IMPACT ASSESSMENT

Recommendation Number 4506

Pool Number _____

River Mile _____

Date Approved by Work Group _____

1. General problem addressed (write out & use number from Att. #1):

   4. Very few disposal sites have been used in such a manner that the material could be made available for a productive use.

2. Sub-problem addressed (write out - use only when necessary):

3. Sub-objective addressed (taken from Att. #2 - write out):

   Selection of sites for dredged material disposal.

4. Tasks accomplished to address problem (taken from Att. #3 - write out):

   Preliminary disposal site selection.
   Final disposal site selection.

5. Listing of alternatives to problem:

   a. No change in disposal site selection process.

   b. Open water disposal should be considered a viable method of dredged material disposal.

   c. Open water disposal should not be considered when market study productive use sites are within reach of equipment.

   d.

   e.

   f.

   g.

6. Selected alternative C (write in the letter)

7. **Rationale for selection of alternative:**

The Iowa State University study shows that the dredged material is a resource and not a waste product.

Market study has determined a great demand for dredged material.

8. **References used to select alternative (use tasks, support documents and/or discussions, studies, articles, etc.):**

Waste Dredged Material for Construction - I.S.U. study

DMUWG marked study

9. **Rationale for elimination of other alternatives:**

A valuable resource is not being utilized to its fullest potential.

10. **Preliminary impact assessment of selected alternative. (List below all general impacts which can be identified by the work group. The level of detail required is only that for which the information is readily available.)**

Increased beneficial use
Dredged material utilization
Efficient use of resource
Local-regional cost savings on aggregate
Increased disposal cost for Corps
User may pay for material if transported beyond long term sites
Corps policy change required
Possible effects on industry
Possible less use of historic sites
Possible reduced environmental impact by promoting use of beneficial use sites
Reduced land distrubed for sand extraction
New equipment requirements
Energy in transport

11. **Reason for work group rejection of recommendation:**

ATTACHMENT #7

RECOMMENDATION # 4506

LOCATION (RIVER MILE)

POOL

RECOMMENDATION IMPACT ASSESSMENT FORM

1. LIST OF IMPACTS (SEE ATT. # 5)	2. UNITS TO BE MEASURED IN	3. PRESENT CONDITION AS OF JAN. 1, 1979 FOR EACH IMPACT	4. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITHOUT RECOMMENDATIONS	5. DESCRIPTION OF MOST PROBABLE FUTURE (2025) WITH RECOMMENDATIONS	6. MEASURE OF IMPACTS (COL. 5-COL. 4)
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Dredged material	yds^3	Dredged material is considered a waste product and not a resource.	Same as present	Dredged material is considered a resource and not a waste product.	14,880,000 cu yds. available for possible productive use over 50 years.
Efficient use of resource. Local-regional cost	yds^3	Minimal use of dredged material	Same as present	Major increase in use of dredged material +10,093,390 cu yds	+10,093,390 cu yds
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Increased disposal cost for Corps.	$	Usually the least expensive environmentally suitable disposal site is used with minimal material made available for beneficial use. $20,000,000	Same as present $20,000,000	Possible increased disposal cost to Corps in using disposal sites that make material available for beneficial use. $59,879,000	-$39,879,000

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LOCATION (RIVER MILE)_____

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LOCATION (RIVER MILE)_____

POOL _____

IMPACT

ASSESSMENT FORM

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ATTACHMENT #7

RECOMMENDATION # 4506

LOCATION (RIVER MILE)

POOL

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Possible effects on industry.	cu yds $	No change	Same as present	Possible loss of market when dredged material is made available to beneficial users. 1,943,390 cu yds $5,091,682	1,943,390 cu yds los: $5,091,682 loss assuming all customers have previously purchased their sand from a private producer.
Business and Industrial activity	$/cu yds	$2.50/cu yd historic disposal cost for 2,390,000 cu yds = $5,975,000	Same as present	Possible increase in industrial activity making use of this less expensive resource cost= $13,238,000 value= $6,261,800 benefits= -$6,976,200	cost= $7,263,000 value= $6,261,800 benefits=-$1,001,200
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Natural resources	cu yds	10,421,250 cu yds	Same as present	Dredged material made available for productive use. 13,694,570 cu yds	3,273,320 cu yds to beneficial use

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